NASA TECHNICAL NOTE

NASA TN D-4030

NASA TN D-4030

AERODYNAMIC DATA ON LARGE SEMISPAN TILTING WING WITH 0.5-DIAMETER CHORD, SINGLE-SLOTTED FLAP, AND SINGLE PROPELLER 0.08 CHORD BELOW WING

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • JULY 1967

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SUMMARY

An investigation has been made in the Langley full-scale tunnel to determine the longitudinal aerodynamic characteristics of a large-scale semispan V/STOL tilt-wing configuration having a single propeller which was tested for both right- and left-hand modes of rotation. The model had a half-fuselage on which loads were measured separately. The wing had a ratio of chord to propeller diameter of 0.5, a 40-percent-chord single-slotted flap, an aspect ratio of 4.88 (2.44 for the semispan), a taper ratio of 1.0, and an NACA 4415 airfoil section.

The data have not been analyzed in detail, but have been examined to observe the predominant trends. It was found that the direction of propeller rotation had a very significant effect on the lift and descent capability (as determined from drag-lift ratios attainable without stalling of any part of the wing within the propeller slipstream) and that up-at-the-tip rotation gave the more favorable results. The use of a trailing-edge flap was also very effective in increasing the descent capability. The use of flow-control devices (slat and fences) was very effective in increasing the descent capability and lift for the case of down-at-the-tip propeller rotation where the characteristics without such devices were poor, but was much less effective for the case of up-at-the-tip propeller rotation where reasonably favorable results were achieved without these devices. For the most favorable combination of the configuration variables, descent angles of nearly 29° were achieved over the entire test range of power conditions.

INTRODUCTION

Most of the aerodynamic research that has been done on tilt-wing propeller-driven V/STOL configurations in the past has been of an exploratory character and has been done with small-scale models. The interest in this type of airplane has now become so substantial, however, that there is need for large-scale systematic aerodynamic design data for this type of airplane. A program has therefore been inaugurated at the Langley Research Center to provide such information by means of tests of a large-scale semispan tilt-wing-and-propeller model. The results for the wing-alone configuration have been published in references 1 to 4. The results for the wing with a fuselage added are presented in references 5 to 7 for the cases of a double-slotted and a single-slotted flap. The results of the present tests are for the same configuration as reference 7 (single-slotted flap), but with the propeller thrust axis located 8 percent of the wing chord below the chord plane. The model had a single propeller on the semispan wing, a ratio of wing chord to diameter of 0.5, a single-slotted flap, a leading-edge slat, and fences. The investigation covered a range of angle of attack from 5° to 85° and a range of thrust coefficients (based on slipstream) from 0.30 to 0.90. Included in the investigation were tests with both directions of propeller rotation. The lift, drag, and pitching moments of the model were measured over the range of test conditions. The flow was observed by means of tufts on the upper surface of the wing. The results of this investigation are presented herein without detailed analysis in order to expedite their dissemination to industry and the military services.

SYMBOLS

The positive sense of forces, moments, and angles is shown in figure 1. The pitching-moment coefficients are presented with reference to the wing quarter-chord line. The coefficients are based on the dynamic pressure in the propeller slipstream. Conventional lift, drag, and pitching-moment coefficients based on the free-stream dynamic pressure can be obtained by dividing the slipstream coefficients by $1 - C_{T,s}$; for example, $C_L = C_{L,s}\Big/\left(1 - C_{T,s}\right)$. The thrust coefficient C_T' may be found from the equation $C_T' = \left[C_{T,s}(A/S)\right]\Big/\left(1 - C_{T,s}\right)$.

Measurements for this investigation were made in the U.S. Customary System of Units. Equivalent values are indicated herein in the International System (SI) in the interest of promoting the use of this system in future NASA reports. Factors relating the two systems of units used in this paper may be found in the appendix.

The coefficients and symbols used in this paper are defined as follows:

A	total propeller disk area, ft^2 $(meters^2)$
b	propeller blade chord, ft (meters); or wing span, ft (meters)
$C_{D,s}$	drag coefficient based on slipstream, D/q_sS
C_L	lift coefficient based on free airstream, L/qS

$C_{L,s}$ lift coefficient based on slipstream, L/q_sS

$C_{L,s(fus)}$ fuselage lift coefficient based on slipstream

$C_{m,s}$ pitching-moment coefficient based on slipstream, M_Y/q_sS

C_T' thrust coefficient based on free airstream, T/qS

$C_{T,s}$ thrust coefficient based on slipstream, $\dfrac{T}{q_s\left(\dfrac{\pi D^2}{4}\right)}$

c wing chord, ft (meters)

c_f flap chord, ft (meters)

D propeller diameter, ft (meters); also, total model drag, lbf (newtons)

h width of slat or of flap-slot gap; also thickness of propeller blade, in. (centimeters)

L total model lift, lbf (newtons)

M_Y pitching moment, lbf-ft (newton-meters)

q free-stream dynamic pressure, $\dfrac{\rho V^2}{2}$, $\dfrac{\text{lbf}}{\text{ft}^2}$ $\left(\dfrac{\text{newtons}}{\text{meters}^2}\right)$

q_s slipstream dynamic pressure, $q + \dfrac{T}{\pi D^2/4}$

R radius of propeller blade, 2.83 ft (0.86 meter)

r radius to element on propeller blade, ft (meters)

S area of semispan wing, 19.6 ft^2 (1.821 meters^2)

T propeller thrust, lbf (newtons)

V free-stream velocity, ft/sec (meters/sec)

x longitudinal distance, ft (meters)

y_l lower-surface ordinate, ft (meters)

y_u upper-surface ordinate, ft (meters)

z vertical distance, ft (meters)

α wing angle of attack, deg

γ flight-path angle (positive for climb), $\tan^{-1} \frac{C_{D,s}}{C_{L,s}}$, deg

δ_f flap deflection, deg

ρ mass density of air, slugs/ft^3 (kilograms/meter^3)

MODEL

The model used in this investigation was a semispan model which would represent the left panel of the full-span wing and the left half of the fuselage. The principal dimensions of the wing are given in figure 2. A three-view drawing of the fuselage-wing combination is given in figure 3. The propeller-blade characteristics are given in figure 4, and a photograph of the model is presented in figure 5.

The wing was mounted on the scale balance system in the tunnel so that the lift and drag of the wing could be read directly about the wind axis. The wing pivoted about its quarter-chord point and its pitching moments were measured about this point and are referred to this point in the data presentation as indicated by figure 1.

When the half-fuselage was added to the existing wing model, it was necessary to cause the fuselage to move relative to the wing quarter-chord point in order to avoid structural conflict between the wing and the fuselage. The fuselage was consequently mounted on a parallel arm arrangement so that it translated as the wing angle of attack was varied. The fuselage moved as though it were pivoted at the 58-percent wing-chord station on the wing lower surface. The illustration in figure 3 shows the relationship of the wing to the fuselage at a given angle of the wing. The fuselage, however, was not actually attached to the wing, and its forces did not register on the wing balance.

Therefore, the load on the fuselage (lift only) was measured on separate strain-gage balances. At all times the fuselage remained at an angle of attack relative to the airstream of 0°.

The wing was constructed to allow numerous modifications to be made in the test configuration, such as a change of wing planform, change of airfoil, the addition of flow-control devices, deflection of the trailing-edge flap, and change of the direction of rotation of the propeller. The basic structure of the wing consisted of a heavy box-beam spar to which a power train to drive the propellers through spanwise shafting was attached, and around which various airfoil contours could be fitted. The propeller location was such that the propeller tip extended out to the wing tip. In the present investigation, both directions of propeller rotation were tested. The propeller thrust was measured by a strain-gage balance which was a part of the propeller shaft. The output was fed through sliprings to an indicating instrument. The required values of thrust for each value of $C_{T,s}$ were set by the operator by changing the speed of the propeller-drive motor. The blade angle at the 0.75R station of the propeller was held constant at 17° throughout the investigation. The propeller was located 0.08c below the wing chord plane and 0.65c ahead of the wing quarter-chord line as shown in figure 2(a). The thrust line was parallel to the wing chord line.

The airfoil used on the wing was the NACA 4415 section with a 2.83 ft (0.86 m) chord. This chord length gave a ratio of wing chord to propeller diameter of 0.5. The reference area of the wing based on a semispan of 6.92 ft (2.11 m) was 19.6 ft^2 (1.82 m^2) and did not include the area of the tip fairing.

The model had a 0.40c single-slotted trailing-edge flap. The flap ordinates and the positions for the various deflections are given in figure 2(c). The flap is illustrated in figure 2(c) for the 40° deflection.

The leading-edge slat shown in figure 2(b) was investigated in combination with the flap on this model. The leading-edge slat was deflected 30° (low position) except for that portion which extended across the top of the fuselage. That section was reduced to 10° deflection (high position, see fig. 2(b)) so that low angles of attack ($\alpha = 5^{\circ}$) could be obtained without the slat touching the fuselage. Otherwise, the minimum angle of attack would have been about 15°.

Fences having a height of 0.20c and extending from 0.13c on the lower surface around the leading edge to about 0.75c on the upper surface were installed at two spanwise locations on the wing (see fig. 2(d)) in an attempt to confine the center-section stall inboard of the propeller slipstream. When tests were made with fences on, both fences were installed.

TESTS

The tests were made for a range of single-slotted-flap deflections with and without a leading-edge slat and fences. The specific configurations tested, together with a list of tables and figures in which data for each may be found, are given in the following table:

Direction of rotation	Configuration	Flap deflection, δ_f, deg	Table (*)	Figure: Wing aerodynamic data	Figure: Fuselage lift coefficients
Down at tip (left hand)	Basic leading edge	0	1	6	37
		20	2	7	37
		40	3	8	37
		60	4	9	37
	Basic leading edge with fences on	0	5	10	38
		20	6	11	38
		40	7	12	38
		60	8	13	38
	Inboard slat	20	9	14	39
		40	10	15	39
		60	11	16	39
	Inboard slat with fences on	20	12	17	40
		40	13	18	40
		60	14	19	40
Up at tip (right hand)	Basic leading edge	0	15	20	41
		20	16	21	41
		40	17	22	41
		60	18	23	41
	Basic leading edge with fences on	0	19	24	42
		20	20	25	42
		40	21	26	42
		60	22	27	42
	Inboard slat	20	23	28	43
		40	24	29	43
		60	25	30	43
	Inboard slat with fences on	20	26	31	44
		40	27	32	44
		60	28	33	44
	Full-span slat with fences on	20	29	34	45
		40	30	35	45
		60	31	36	45

*The (a) part of each table gives the tabulated wing data and the (b) part gives the tabulated fuselage data.

The tests were made over a range of thrust coefficients from 0.30 to 0.90. For any given test, the thrust coefficient was held constant over the angle-of-attack range by adjusting the propeller speed to give the required thrust at each angle of attack. The angle-of-attack range was from 5° to that required to stall the wing or to develop a drag-lift ratio of about 0.3, whichever occurred first. The test Reynolds number, based on the wing chord length and the velocity of the propeller slipstream, was about 2.38×10^{6}.

No tunnel-wall corrections have been applied to the data since surveys and analysis had indicated that there would be no significant correction, as explained in reference 1.

DISCUSSION

The data presented have not been analyzed in detail, but have been examined to observe general trends. A few such trends predominate. One very general observation was that the force-test data could not be used as an indication of the occurrence or extent of wing stalling. The tuft-tests results show that the onset of stalling over significant areas of the part of the wing within the propeller slipstream frequently occurs considerably below or above the angle of attack for maximum lift coefficient. The data were examined, in particular, to determine the effect of the various test variables on descent capability – the descent capability being determined from the drag-lift values attainable just prior to indication by the tufts of stalling of any part of the wing within the propeller slipstream and to determine the effect of the lower propeller position as compared with references 6 and 7.

Effect of Direction of Propeller Rotation

The force- and tuft-test data show that the up-at-the-tip direction of rotation consistently gave higher maximum lift and higher descent capability. In general, the tuft pictures show that with down-at-the-tip rotation, rough flow and stalling occurred at angles of attack as much as 25° to 30° lower than for the wing with up-at-the-tip rotation for the higher thrust coefficients, especially for $C_{T,s} = 0.90$. Down-at-the-tip propeller rotation consistently causes stalling (of the part of the wing in the slipstream) to start inboard of the nacelle, that is, behind the up-going blades. When stall occurred on the wing for the up-at-the-tip mode of rotation, it most frequently occurred outboard of the nacelle.

Effect of Leading-Edge Slat

Comparison of figures 7 to 9 with figures 14 to 16 for down-at-the-tip rotation and figures 21 to 23 with figures 28 to 30 for up-at-the-tip rotation shows the effect of the inboard leading-edge slat. The force- and tuft-test data show that for both directions of propeller rotation, the slat was beneficial in extending maximum lift to higher angles of attack (particularly for the lower thrust coefficients, $C_{T,s} = 0.30$ and 0.60). Only for down-at-the-tip rotation and $C_{T,s} = 0.30$ and 0.60, however, did the slat give any appreciable increase in descent capability. For $\delta_f = 40^o$ and 60^o and $C_{T,s} = 0.90$ and 0.80, the inboard slat had little effect on lift, but it was detrimental to descent capability.

The effect of adding the outboard part of the slat (full-span slat configuration shown in figs. 34 to 36) was determined only for the case of up-at-the-tip rotation inasmuch as the wing tip was not stalled for down-at-the-tip rotation. In order to determine the effect of the outboard part of the slat, these data should be compared with those for the inboard slat alone (figs. 31 to 33). The tuft tests show that the outboard section of the slat reduced the tip stalling which occurred at the lower thrust coefficients and produced an appreciable increase in descent capability. With up-at-the-tip rotation, full-span slat, and fences (figs. 34 to 36), a descent capability of nearly 29^o was obtained with a flap deflection of 60^o.

Effect of Fences

The effect of fences can be ascertained for both directions of propeller rotation for the model with the basic leading edge and leading-edge slat installed conditions. Compare figures 7 to 19 for down-at-the-tip rotation and figures 20 to 33 for up-at-the-tip rotation. These results, as in previous investigations with the propeller thrust line above the wing chord and at 0.19c below the chord line, show that the fences were most effective for the case of down-at-the-tip mode of propeller rotation. In this case the wing has a tendency to stall inboard of the nacelle because of the rotation of the propeller slipstream. The fences are effective in preventing the center-section stall from spreading spanwise and prematurely triggering stall of the wing in the propeller slipstream inboard of the nacelle, especially at high thrust coefficients and flap deflections. Specifically, the results of the present tests show that the fences with up-at-the-tip rotation caused some slight increase in lift and descent capability. For the case of down-at-the-tip propeller rotation, however, the fences gave significantly more descent capability for flap deflections of 40^o and 60^o, particularly for the higher thrust coefficients and when used in combination with the slat as may be seen by comparing figures 14 to 19.

Effect of Flap Deflection

There was a progressive increase in maximum lift coefficient and descent capability as flap deflection was increased. The greatest increment occurred with the deflection from 0^o to 20^o for either mode of propeller rotation. It must be pointed out, however, that for down-at-the-tip rotation, the model with $\delta_f = 0^o$ had a negative descent capability ($\gamma \approx 20^o$). (See fig. 6.) With a flap deflection of 20^o (fig. 7), there was a change of descent angle of approximately 15^o in the positive direction, but this change was not enough to produce any noticeable descent capability. With up-at-the-tip rotation, increasing flap deflection from 0° to 20° increased the descent capability from about 6° to about 17°.

Fuselage Lift

The fuselage lifts plotted in figures 37 to 45 are presented in the same nondimensional units as the wing lift coefficients. In general, the maximum fuselage lift occurred at about the angle of attack for maximum lift. This trend was true for the various flap deflections and for both directions of propeller rotation. The inboard slat and fences had no appreciable effect on the fuselage loading.

Effect of Propeller Position

An extensive analysis has not been made for the effects of propeller position on the model characteristics; but general observations of the results of reference 6 with the propeller above wing chord, the results of reference 7 with the propeller 0.19c below the wing chord, and the results of the subject investigation have been made. This cursory examination of the data indicates that the lower propeller positions provide much higher descent capabilities than the higher positions do. For example, with a flap deflection of 20° and up-at-the-tip rotation, descent angles of about 13° were obtained for the high propeller position; whereas, for the low propeller position, a descent angle of about 27° was obtained at high thrust coefficient conditions. (See refs. 6, 7, and 8.)

CONCLUSIONS

The following conclusions were drawn from the results of the investigation:

1. The direction of propeller rotation had a significant effect on the lift and descent capability attainable for most of the configurations tested, the up-at-the-tip mode of propeller rotation giving the more favorable results.

2. Flow-control devices (slat and fences) were very effective in improving the descent capability for the down-at-the-tip mode of propeller rotation. With a leading-edge slat and fences, almost as favorable results could be achieved with this mode of propeller rotation as with up-at-the-tip rotation.

3. The use of flaps was very effective in increasing the lift and the descent capability for either mode of rotation for most configurations. With flap deflections of 40°

or 60° and with the most favorable combination of the flow-control devices of the test, descent angles of nearly 29° were achieved over the entire range of power conditions.

Langley Research Center,
National Aeronautics and Space Administration,
Langley Station, Hampton, Va., February 16, 1967,
721-01-00-11-23.

APPENDIX

CONVERSION FACTORS – U.S. CUSTOMARY UNITS TO SI UNITS

The International System of Units (SI) was adopted by the Eleventh General Conference on Weights and Measures, Paris, October 1960. (See ref. 9.) The following conversion factors are included in this report for convenience:

Physical quantity	U.S. Customary Unit	Conversion factor (*)	SI Unit
Area	ft^2	0.0929	meters^2 (m^2)
Density.	$slugs/ft^3$	515.38	kilograms/meter^3 (kg/m^3)
Force	lbf	4.448	newtons (N)
Length	in.	0.0254	meters (m)
	ft	0.3048	meters (m)
Moment	lbf-ft	1.356	newton-meters (N-m)
Pressure	lbf/ft^2	47.88	newtons/meter^2 (N/m^2)
Velocity	ft/sec	0.3048	meters/second (m/sec)

*Multiply value given in U.S. Customary Unit by conversion factor to obtain equivalent value in SI Unit.

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TABLE 1.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 0^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.290	-1.122	0.145	0.352	-1.045	0.142
10	.449	-1.091	.158	.537	-1.013	.161
15	.596	-1.041	.168	.711	-.957	.188
20	.737	-.981	.191	.893	-.875	.197
25	.860	-.899	.187	1.047	-.770	.206
30	.955	-.796	.191	1.156	-.639	.206
35	1.056	-.685	.196	1.269	-.508	.205
40	1.143	-.567	.199	1.369	-.354	.214
45	1.215	-.453	.201	1.408	-.188	.204
50	1.269	-.326	.201	1.429	-.044	.193
55	1.297	-.178	.199	1.422	.073	.199
60	1.301	-.050	.198	1.387	.179	.205
65	1.302	.053	.210	1.360	.284	.212
70	1.283	.155	.212			
75	1.251	.241	.215			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	0.381	-0.740	0.103	0.428	-0.353	0.035
10	.582	-.677	.130	.688	-.302	.080
15	.805	-.621	.147	.936	-.230	.100
20	1.002	-.525	.166	1.146	-.132	.123
25	1.176	-.413	.167	1.318	-.002	.112
30	1.285	-.274	.171	1.172	.129	.069
35	1.284	-.105	.143	1.280	.284	.065
40	1.318	.021	.143	1.262	.406	.061
45	1.324	.140	.144			
50	1.328	.268	.145			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	0.006	0.014	-0.008	-0.022
10	-.002	.010	.003	-.027
15	-.012	.004	.005	-.024
20	-.017	.011	.015	-.001
25	-.013	.022	.026	.016
30	-.003	.037	.041	.001
35	.006	.044	.052	.024
40	.009	.045	.058	.030
45	.009	.051	.064	
50	.019	.057	.067	
55	.023	.053		
60	.026	.047		
65	.015	.062		
70	.017			
75	.016			

TABLE 2.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 20^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.562	-1.039	0.006	0.662	-0.898	-0.014
10	.711	-.987	.020	.853	-.853	-.014
15	.860	-.903	.017	1.043	-.736	-.001
20	1.004	-.811	.029	1.218	-.624	-.001
25	1.112	-.687	.029	1.324	-.498	.003
30	1.217	-.573	.028	1.398	-.353	.005
35	1.287	-.444	.025	1.480	-.189	0
40	1.357	-.305	.033	1.537	-.020	-.007
45	1.395	-.179	.029	1.517	.114	-.005
50	1.402	-.050	.027	1.445	.209	.008
55	1.389	.077	.036	1.343	.229	.025
60	1.352	.170	.042	1.289	.309	.043
65	1.326	.255	.069	1.243	.385	.074
70	1.277	.309	.094	1.202	.458	.107
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	0.789	-0.623	-0.057	0.940	-0.238	-0.134
10	1.044	-.546	-.050	1.250	-.152	-.125
15	1.300	-.437	-.043	1.554	-.025	-.126
20	1.505	-.295	-.056	1.798	.149	-.141
25	1.659	-.146	-.047	1.995	.317	-.145
30	1.633	.011	-.057	1.518	.408	-.175
35	1.546	.159	-.065	1.419	.514	-.167
40	1.498	.273	-.056	1.336	.621	-.169
45	1.436	.362	-.033			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.025	0.004	0.031	0.034
10	-.023	0	.036	.038
15	-.033	0	.043	.051
20	-.032	.008	.053	.057
25	-.026	.023	.066	.067
30	-.019	.044	.078	.015
35	-.010	.057	.073	.034
40	-.003	.065	.072	.034
45	.004	.066	.064	
50	.007	.055		
55	.010	.049		
60	.016	.044		
65	.011	.037		
70	-.006	.040		

TABLE 3.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 40^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.770	-0.930	-0.062	0.900	-0.770	-0.086
10	.909	-.853	-.059	1.082	-.683	-.078
15	1.047	-.758	-.050	1.258	-.567	-.083
20	1.173	-.636	-.053	1.415	-.427	-.080
25	1.288	-.516	-.058	1.472	-.300	-.077
30	1.335	-.390	-.049	1.527	-.134	-.078
35	1.389	-.251	-.041	1.576	.028	-.075
40	1.422	-.127	-.030	1.591	.175	-.071
45	1.424	.002	-.035	1.496	.268	-.052
50	1.407	.111	-.016	1.393	.299	-.032
55	1.380	.208	.004	1.299	.333	-.007
60	1.327	.281	.019	1.246	.407	.017
65	1.270	.321	.041			
70	1.215	.368	.073			
75	1.182	.426	.103			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.072	-0.497	-0.140	1.258	-0.100	-0.218
10	1.337	-.386	-.138	1.594	.038	-.230
15	1.581	-.247	-.148	1.889	.198	-.230
20	1.741	-.073	-.152	2.112	.390	-.240
25	1.832	.084	-.156	2.243	.568	-.233
30	1.722	.229	-.142	1.519	.533	-.196
35	1.566	.317	-.124	1.395	.636	-.202
40	1.466	.392	-.082	1.318	.730	-.180
45	1.403	.463	-.064			
50	1.329	.515	-.029			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.042	-0.006	0.042	0.065
10	-.045	-.007	.047	.069
15	-.039	0	.057	.085
20	-.035	.009	.069	.097
25	-.030	.024	.072	.088
30	-.018	.045	.078	.025
35	-.012	.061	.059	.027
40	-.008	.066	.048	.033
45	0	.050	.037	
50	.010	.033	.025	
55	.014	.028		
60	-.017	.011		
65	-.023			
70	-.027			
75	-.028			

TABLE 4.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 60^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.943	-0.763	-0.116	1.138	-0.592	-0.160
10	1.069	-.672	-.116	1.316	-.477	-.165
15	1.171	-.557	-.111	1.443	-.344	-.154
20	1.267	-.441	-.112	1.562	-.197	-.153
25	1.329	-.319	-.104	1.581	-.054	-.141
30	1.383	-.182	-.111	1.599	.096	-.141
35	1.401	-.053	-.092	1.581	.098	-.138
40	1.411	.079	-.091	1.556	.339	-.098
45	1.397	.180	-.070	1.444	.383	-.076
50	1.365	.289	-.069	1.301	.373	-.032
55	1.320	.361	-.048	1.232	.427	-.006
60	1.260	.397	-.014	1.179	.468	.003
65	1.193	.435	.010	1.107	.517	.039
70	1.149	.479	.035			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.341	-0.287	-0.219	1.630	0.159	-0.282
10	1.618	-.134	-.231	1.886	.304	-.278
15	1.821	.025	-.236	2.149	.489	-.288
20	1.887	.183	-.214	2.348	.623	-.318
25	1.894	.342	-.213	2.282	.833	-.281
30	1.687	.409	-.158	1.427	.671	-.186
35	1.481	.417	-.103	1.327	.763	-.176
40	1.385	.481	-.076	1.264	.863	-.164
45	1.307	.532	-.049			
50	1.221	.565	-.011			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.049	-0.005	0.061	0.098
10	-.054	-.003	.072	.094
15	-.045	.014	.078	.118
20	-.041	.028	.081	.115
25	-.042	.038	.074	.081
30	-.034	.049	.068	.009
35	-.026	.049	.036	.004
40	-.021	.053	.023	-.009
45	-.026	.027	.002	
50	-.027	.007	-.012	
55	-.043	-.006		
60	-.047	-.014		
65	-.049	-.005		
70	-.042			

TABLE 5.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 0^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.306	-1.127	0.151	0.336	-0.983	0.130
10	.464	-1.107	.160	.514	-.942	.140
15	.613	-1.053	.175	.692	-.891	.170
20	.752	-.978	.190	.857	-.817	.177
25	.899	-.909	.195	1.023	-.716	.188
30	.999	-.795	.197	1.148	-.589	.197
35	1.107	-.676	.205	1.258	-.460	.199
40	1.207	-.550	.204	1.369	-.309	.197
45	1.298	-.416	.202	1.431	-.152	.194
50	1.350	-.268	.193	1.451	-.007	.193
55	1.392	-.114	.199	1.344	.095	.168
60	1.408	.010	.199	1.322	.192	.179
65	1.408	.135	.208	1.288	.285	.192
70	1.385	.249	.223	1.271	.380	.214
75	1.353	.343	.240			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	0.379	-0.717	0.090	0.444	-0.355	0.033
10	.603	-.687	.127	.711	-.320	.071
15	.815	-.616	.141	.954	-.228	.099
20	1.037	-.530	.168	1.194	-.132	.122
25	1.233	-.415	.174	1.207	.005	.083
30	1.376	-.271	.182	1.250	.162	.051
35	1.283	-.110	.112	1.292	.305	.023
40	1.317	.020	.108	1.321	.456	.025
45	1.298	.144	.115			
50	1.310	.269	.107			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	0.016	0.018	-0.002	-0.019
10	.003	.016	.017	-.018
15	-.010	.014	.019	-.011
20	-.009	.019	.024	.017
25	-.006	.024	.041	.006
30	-.001	.041	.061	.022
35	.001	.044	.059	.025
40	.002	.051	.069	.042
45	.004	.059	.062	
50	.006	.066	.065	
55	.017	.061		
60	.021	.074		
65	.027	.058		
70	.027	.072		
75	.019			

TABLE 6.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.578	-1.026	0.003	0.690	-0.890	-0.025
10	.733	-.965	.015	.886	-.823	-.014
15	.887	-.897	.013	1.063	-.729	-.008
20	1.031	-.795	.023	1.230	-.608	-.006
25	1.151	-.676	.024	1.361	-.465	-.005
30	1.258	-.542	.017	1.485	-.310	-.010
35	1.363	-.396	.013	1.579	-.135	-.020
40	1.435	-.241	.016	1.647	.037	-.020
45	1.480	-.098	.014	1.662	.192	-.023
50	1.507	.062	.020	1.626	.327	-.006
55	1.511	.195	.031	1.315	.207	.026
60	1.463	.307	.041	1.276	.291	.050
65	1.432	.415	.053	1.250	.377	.081
70	1.381	.487	.076			
75	1.320	.555	.103			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	0.800	-0.622	-0.071	0.933	-0.221	-0.138
10	1.055	-.532	-.067	1.251	-.129	-.135
15	1.371	-.444	-.057	1.567	-.008	-.128
20	1.595	-.286	-.076	1.844	.165	-.136
25	1.712	-.116	-.073	2.075	.344	-.141
30	1.789	.074	-.086	1.614	.454	-.193
35	1.828	.257	-.092	1.608	.614	-.196
40	1.494	.289	-.083	1.329	.615	-.155
45	1.360	.328	-.054			
50	1.354	.456	-.046			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.018	0.012	0.032	0.051
10	-.028	.008	.047	.059
15	-.030	.010	.057	.062
20	-.031	.019	.061	.086
25	-.026	.038	.082	.096
30	-.018	.053	.105	.054
35	-.011	.068	.114	.075
40	-.002	.076	.077	.030
45	.004	.088	.049	
50	.016	.093	.070	
55	.026	.070		
60	.031	.061		
65	.033	.035		
70	.020			
75	.006			

TABLE 7.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 40^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ 0.80		
5	0.767	-0.923	-0.056	0.908	-0.763	-0.083
10	.921	-.844	-.055	1.097	-.670	-.082
15	1.069	-.746	-.051	1.276	-.543	-.087
20	1.202	-.621	-.063	1.434	-.400	-.083
25	1.305	-.492	-.060	1.549	-.244	-.090
30	1.398	-.342	-.067	1.650	-.063	-.103
35	1.483	-.179	-.071	1.713	.120	-.113
40	1.530	-.016	-.070	1.722	.289	-.108
45	1.543	.117	-.053	1.699	.418	-.090
50	1.546	.272	-.047	1.627	.512	-.062
55	1.507	.394	-.039	1.288	.328	-.003
60	1.462	.487	-.022	1.250	.421	.013
65	1.395	.558	.002	1.212	.490	.062
70	1.333	.628	.029			
75	1.268	.666	.059			
	$C_{T,s}$ 0.60			$C_{T,s}$ = 0.30		
5	1.091	-0.487	-0.142	1.279	-0.089	-0.221
10	1.355	-.373	-.146	1.613	.029	-.222
15	1.615	-.231	-.155	1.915	.199	-.231
20	1.805	-.056	-.162	2.175	.400	-.243
25	1.941	.126	-.166	1.775	.461	-.218
30	1.916	.319	-.165	1.679	.613	-.241
35	1.596	.309	-.136	1.648	.758	-.209
40	1.466	.407	-.114	1.313	.723	-.182
45	1.323	.432	-.076			
50	1.312	.519	-.039			
55	1.246	.581	-.007			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.026	0.008	0.049	0.087
10	-.030	.007	.049	.095
15	-.033	.014	.068	.102
20	-.029	.023	.082	.118
25	-.022	.039	.099	.066
30	-.015	.057	.111	.074
35	-.005	.074	.114	.072
40	-.005	.077	.054	.030
45	.010	.087	.043	
50	.021	.086	.042	
55	.029	.029	.029	
60	.032	.008		
65	.028	.012		
70	.002			
75	0			

TABLE 8.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.962	-0.749	-0.125	1.119	-0.579	-0.151
10	1.107	-.654	-.119	1.308	-.456	-.159
15	1.222	-.531	-.122	1.458	-.309	-.158
20	1.326	-.391	-.124	1.571	-.153	-.154
25	1.395	-.269	-.120	1.644	.005	-.168
30	1.455	-.110	-.122	1.701	.173	-.165
35	1.486	.040	-.122	1.706	.339	-.154
40	1.506	.192	-.124	1.668	.466	-.126
45	1.509	.336	-.107	1.623	.577	-.102
50	1.465	.435	-.088	1.256	.356	-.035
55	1.405	.520	-.067	1.237	.482	-.010
60	1.334	.573	-.050	1.192	.532	.015
65	1.262	.612	-.027	1.123	.546	.053
70	1.186	.627	.010			
75	1.114	.660	.038			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.351	-0.283	-0.224	1.602	0.115	-0.298
10	1.604	-.130	-.223	1.874	.250	-.274
15	1.827	.045	-.236	2.133	.432	-.284
20	1.976	.238	-.241	2.376	.686	-.302
25	2.034	.410	-.233	1.683	.590	-.225
30	1.934	.538	-.201	1.623	.726	-.218
35	1.476	.407	-.134	1.292	.729	-.175
40	1.312	.444	-.081			
45	1.228	.495	-.069			
50	1.201	.574	-.033			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.030	0.023	0.066	0.115
10	-.032	.032	.075	.123
15	-.029	.036	.085	.128
20	-.018	.042	.103	.158
25	-.020	.047	.113	.068
30	-.012	.065	.111	.060
35	-.010	.080	.041	.021
40	-.013	.084	.021	
45	-.004	.089	.003	
50	.003	.019	-.010	
55	.021	.003		
60	.013	-.002		
65	-.004	-.005		
70	.002			
75	-.012			

TABLE 9.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 20^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.545	-1.053	-0.001	0.627	-0.914	-0.022
10	.708	-.989	.014	.824	-.844	-.013
15	.860	-.914	.014	1.024	-.754	.003
20	1.001	-.823	.024	1.203	-.641	.003
25	1.117	-.717	.032	1.330	-.503	.004
30	1.219	-.595	.024	1.442	-.369	.010
35	1.274	-.473	.023	1.475	-.237	.012
40	1.339	-.332	.029	1.509	-.079	.011
45	1.373	-.199	.033	1.520	.056	.012
50	1.398	-.081	.041	1.497	.168	.036
55	1.400	.044	.052	1.462	.256	.069
60	1.379	.143	.068			
65	1.382	.267	.080			
70	1.343	.355	.097			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.703	-0.636	-0.070	0.777	-0.251	-0.142
10	.983	-.556	-.064	1.148	-.159	-.132
15	1.267	-.442	-.057	1.508	-.028	-.128
20	1.512	-.308	-.051	1.820	.125	-.122
25	1.676	-.150	-.044	2.061	.300	-.109
30	1.808	.014	-.040	1.848	.440	-.148
35	1.856	.180	-.038	1.866	.566	-.127
40	1.672	.280	-.039	1.857	.687	-.116
45	1.669	.444	-.026			
50	1.617	.540	-.008			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.009	0.020	0.055	0.068
10	-.021	.008	.043	.058
15	-.022	.004	.040	.038
20	-.021	.007	.046	.038
25	-.015	.020	.058	.051
30	-.009	.029	.067	.029
35	-.009	.043	.071	.025
40	-.006	.051	.058	.020
45	0	.048	.066	
50	.004	.045	.055	
55	.009	.042		
60	.004			
65	.002			
70	-.006			

TABLE 10.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 40^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.731	-0.949	-0.054	0.855	-0.793	-0.097
10	.886	-.873	-.052	1.037	-.694	-.081
15	1.028	-.773	-.045	1.229	-.589	-.087
20	1.157	-.655	-.044	1.380	-.449	-.074
25	1.241	-.550	-.045	1.475	-.318	-.068
30	1.312	-.426	-.040	1.545	-.173	-.068
35	1.347	-.302	-.028	1.526	-.039	-.058
40	1.380	-.171	-.020	1.536	.100	-.050
45	1.379	-.054	-.013	1.506	.190	-.043
50	1.372	.054	-.002	1.472	.274	-.010
55	1.373	.165	.013	1.424	.353	.031
60	1.368	.278	.028			
65	1.317	.340	.040			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.997	-0.504	-0.139	1.130	-0.104	-0.211
10	1.293	-.396	-.135	1.521	.015	-.224
15	1.553	-.248	-.145	1.860	.184	-.218
20	1.762	-.085	-.141	2.142	.374	-.214
25	1.896	.091	-.132	2.309	.571	-.212
30	1.976	.259	-.127	2.421	.766	-.192
35	1.906	.382	-.102	2.202	.815	-.134
40	1.671	.409	-.060	2.015	.866	-.088
45	1.680	.574	-.057	1.746	.886	-.066

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.030	0.007	0.055	0.093
10	-.033	.004	.049	.080
15	-.030	.008	.052	.072
20	-.026	.017	.061	.079
25	-.019	.025	.073	.099
30	-.014	.036	.075	.091
35	-.013	.048	.065	.058
40	-.008	.039	.052	.041
45	-.003	.033	.052	.030
50	-.008	.026		
55	-.017	.016		
60	-.015			
65	-.026			

TABLE 11.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 60^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.963	-0.778	-0.123	1.116	-0.605	-0.167
10	1.095	-.678	-.123	1.291	-.489	-.164
15	1.200	-.568	-.120	1.419	-.370	-.152
20	1.286	-.452	-.104	1.525	-.234	-.137
25	1.325	-.346	-.092	1.578	-.083	-.135
30	1.369	-.217	-.094	1.558	.038	-.117
35	1.381	-.096	-.083	1.549	.156	-.096
40	1.376	.015	-.062	1.514	.261	-.072
45	1.349	.099	-.049	1.472	.329	-.038
50	1.340	.196	-.029	1.401	.368	-.005
55	1.306	.273	-.016	1.321	.427	.024
60	1.242	.307	.006	1.301	.545	.040
65	1.214	.370	.029			
70	1.190	.433	.046			
75	1.160	.533	.057			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.323	-0.295	-0.217	1.526	0.103	-0.310
10	1.549	-.162	-.222	1.858	.260	-.299
15	1.772	-.004	-.215	2.128	.444	-.286
20	1.927	.169	-.202	2.313	.637	-.280
25	1.984	.327	-.185	2.401	.830	-.255
30	1.939	.463	-.151	2.367	.945	-.211
35	1.746	.446	-.071	2.156	.953	-.119
40	1.576	.476	-.050	1.797	.865	-.060
45	1.573	.651	-.047	1.657	.964	-.059
50	1.491	.725	-.005			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.036	0.008	0.071	0.124
10	-.038	.013	.062	.114
15	-.029	.025	.062	.104
20	-.022	.036	.069	.098
25	-.019	.043	.081	.099
30	-.015	.043	.073	.075
35	-.010	.036	.047	.040
40	-.011	.029	.027	.007
45	-.016	.018	.025	.006
50	-.032	.005	.020	
55	-.051	-.012		
60	-.046	-.013		
65	-.057			
70	-.047			
75	-.040			

TABLE 12.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 20^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.572	-1.038	-0.004	0.649	-0.904	-0.031
10	.722	-.982	.003	.854	-.839	-.023
15	.881	-.907	.012	1.046	-.738	-.009
20	1.032	-.805	.016	1.238	-.625	-.005
25	1.160	-.696	.020	1.379	-.491	-.002
30	1.263	-.566	.018	1.517	-.339	.002
35	1.374	-.419	.020	1.613	-.153	-.001
40	1.450	-.261	.020	1.702	.026	-.004
45	1.508	-.110	.021	1.741	.192	-.001
50	1.520	.017	.028	1.504	.160	.032
55	1.426	.068	.045	1.471	.257	.060
60	1.408	.165	.060	1.412	.331	.088
65	1.386	.234	.074	1.475	.567	.103
70	1.317	.295	.099	1.392	.631	.134
75	1.287	.380	.128			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	0.722	-0.619	-0.079	0.789	-0.247	-0.154
10	1.025	-.544	-.068	1.160	-.150	-.141
15	1.302	-.441	-.054	1.541	-.030	-.132
20	1.533	-.284	-.056	1.841	.144	-.123
25	1.744	-.136	-.041	2.119	.329	-.122
30	1.919	.056	-.040	2.270	.549	-.110
35	2.001	.248	-.049	1.953	.594	-.137
40	1.827	.347	-.039	1.884	.707	-.118
45	1.744	.475	-.027			
50	1.713	.600	-.014			
55	1.614	.697	.011			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.015	0.013	0.055	0.072
10	-.028	.004	.047	.069
15	-.035	.002	.044	.056
20	-.035	.009	.052	.062
25	-.030	.020	.069	.081
30	-.021	.033	.078	.071
35	-.011	.051	.097	.022
40	-.008	.055	.075	.043
45	-.002	.062	.066	
50	.004	.056	.065	
55	.006	.057	.053	
60	.003	.043		
65	-.015	.031		
70	-.025	.016		
75	-.015			

TABLE 13.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 40^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.761	-0.941	-0.067	0.933	-0.842	-0.100
10	.912	-.866	-.066	1.144	-.736	-.089
15	1.063	-.765	-.061	1.350	-.609	-.099
20	1.202	-.641	-.062	1.517	-.457	-.089
25	1.306	-.516	-.066	1.662	-.286	-.088
30	1.411	-.361	-.063	1.778	-.101	-.108
35	1.495	-.194	-.066	1.856	.097	-.107
40	1.548	-.039	-.061	1.907	.289	-.099
45	1.576	.108	-.058	1.862	.426	-.080
50	1.550	.226	-.040	1.811	.561	-.053
55	1.530	.364	-.027	1.505	.379	.027
60	1.404	.340	.010	1.434	.447	.052
65	1.317	.329	.047	1.516	.736	.069
70	1.264	.366	.070	1.431	.794	.095
75	1.238	.425	.097			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.018	-0.491	-0.150	1.156	-0.098	-0.225
10	1.330	-.386	-.152	1.536	.019	-.229
15	1.588	-.240	-.159	1.886	.180	-.222
20	1.799	-.067	-.159	2.177	.380	-.223
25	1.989	.113	-.153	2.393	.594	-.223
30	2.088	.318	-.144	2.449	.830	-.231
35	2.117	.499	-.141	1.885	.695	-.147
40	2.014	.648	-.117	1.807	.789	-.119
45	1.686	.563	-.053	1.689	.882	-.086
50	1.644	.693	-.032			
55	1.541	.747	.017			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.035	0.002	0.057	0.100
10	-.039	0	.057	.097
15	-.039	.003	.056	.091
20	-.035	.017	.072	.101
25	-.029	.027	.084	.107
30	-.019	.045	.093	.089
35	-.011	.057	.113	.011
40	-.011	.064	.099	.015
45	-.007	.070	.051	.028
50	.007	.078	.043	
55	.006	.043	.032	
60	-.015	.022		
65	-.029	.034		
70	-.027	.007		
75	-.023			

TABLE 14.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.957	-0.769	-0.129	1.123	-0.598	-0.174
10	1.112	-.663	-.132	1.320	-.459	-.180
15	1.225	-.537	-.129	1.471	-.336	-.167
20	1.334	-.414	-.128	1.596	-.180	-.168
25	1.412	-.276	-.123	1.668	-.013	-.170
30	1.473	-.120	-.126	1.732	.160	-.158
35	1.522	.025	-.126	1.760	.324	-.145
40	1.536	.178	-.114	1.752	.481	-.140
45	1.544	.320	-.103	1.694	.577	-.102
50	1.502	.441	-.089	1.638	.684	-.077
55	1.448	.528	-.064	1.324	.432	.014
60	1.395	.603	-.043	1.408	.766	.002
65	1.327	.673	-.025	1.324	.817	.027
70	1.246	.708	.005			
75	1.177	.735	.021			
80	1.103	.768	.052			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.364	-0.285	-0.234	1.549	0.109	-0.304
10	1.601	-.155	-.227	1.862	.249	-.288
15	1.802	.007	-.219	2.094	.414	-.262
20	1.978	.192	-.213	2.302	.629	-.248
25	2.054	.362	-.199	2.418	.825	-.242
30	2.119	.558	-.171	1.951	.712	-.133
35	2.078	.697	-.158	1.877	.816	-.124
40	1.949	.804	-.124	1.838	.944	-.103
45	1.749	.778	-.052			
50	1.558	.764	-.012			
55	1.466	.821	-.028			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.046	-0.002	0.061	0.126
10	.049	.005	.063	.128
15	.037	.025	.076	.109
20	.027	.039	.089	.119
25	.023	.045	.093	.122
30	.017	.053	.105	.054
35	.014	.062	.110	.038
40	.015	.065	.085	.043
45	.013	.078	.055	
50	.011	.075	.031	
55	.002	.016	.017	
60	.014	.040		
65	.020	.010		
70	.025			
75	.017			
80	.022			

TABLE 15.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 0^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5				0.284	-1.011	0.141
10	0.412	-1.119	0.169	.466	-.965	.152
15	.567	-1.064	.184	.653	-.913	.179
20	.711	-.991	.196	.831	-.832	.194
25	.844	-.909	.195	.992	-.732	.200
30	.967	-.800	.190	1.107	-.613	.209
35	1.059	-.694	.195	1.205	-.480	.207
40	1.153	-.575	.198	1.309	-.339	.200
45	1.231	-.460	.201	1.387	-.195	.206
50	1.290	-.327	.200	1.430	-.052	.203
55	1.329	-.197	.196	1.458	.088	.209
60	1.361	-.070	.197	1.473	.222	.215
65	1.365	.061	.189	1.459	.339	.213
70	1.372	.180	.194	1.420	.454	.218
75	1.356	.297	.196	1.312	.544	.203
80	1.329	.410	.205			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.330	-0.739	0.098	0.399	-0.371	0.040
10	.556	-.691	.130	.656	-.327	.088
15	.770	-.629	.144	.911	-.245	.108
20	.996	-.532	.172	1.155	-.136	.133
25	1.198	-.417	.166	1.354	-.008	.129
30	1.306	-.276	.168	1.477	.155	.110
35	1.396	-.125	.175	1.313	.308	.049
40	1.484	.025	.173			
45	1.481	.230	.135			
50	1.484	.375	.131			
55	1.393	.487	.108			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5		0.009	-0.009	-0.033
10	0.016	.013	0	-.025
15	.020	.016	.009	-.015
20	.020	.027	.017	0
25	.028	.032	.032	.022
30	.036	.049	.058	.030
35	.047	.068	.082	.047
40	.053	.074	.091	
45	.055	.084	.098	
50	.058	.089	.101	
55	.063	.094	.101	
60	.061	.093		
65	.062	.091		
70	.056	.095		
75	.050	.083		
80	.037			

TABLE 16.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 20^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.535	-1.065	0.025	0.644	-0.911	-0.014
10	.707	-1.011	.028	.833	-.828	-.010
15	.853	-.916	.026	1.021	-.731	-.003
20	.991	-.814	.029	1.193	-.609	-.008
25	1.114	-.696	.026	1.345	-.469	-.012
30	1.229	-.568	.020	1.429	-.322	-.005
35	1.309	-.428	.016	1.489	-.175	-.009
40	1.380	-.291	.025	1.543	-.019	-.006
45	1.420	-.149	.017	1.564	.118	-.001
50	1.454	-.003	.021	1.578	.242	.012
55	1.452	.114	.027	1.540	.339	.032
60	1.437	.218	.038	1.507	.447	.047
65	1.410	.305	.054	1.462	.549	.060
70	1.370	.403	.062	1.403	.616	.098
75	1.334	.480	.084	1.323	.661	.117
80	1.288	.538	.114			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.747	-0.634	-0.070	0.893	-0.235	-0.147
10	1.018	-.546	-.070	1.222	-.137	-.147
15	1.278	-.419	-.071	1.554	.001	-.144
20	1.505	-.276	-.074	1.786	.171	-.159
25	1.692	-.119	-.069	2.027	.349	-.169
30	1.736	.053	-.080	2.014	.533	-.184
35	1.736	.214	-.085	1.928	.683	-.178
40	1.739	.353	-.064	1.628	.785	-.169
45	1.706	.468	-.052	1.421	.803	-.148
50	1.563	.581	-.038			
55	1.430	.662	-.025			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.020	0.034	0.045	0.034
10	.016	.036	.050	.050
15	.014	.037	.060	.058
20	.014	.042	.073	.066
25	.022	.063	.084	.092
30	.034	.079	.100	.094
35	.040	.080	.113	.099
40	.038	.078	.118	.087
45	.039	.082	.120	.067
50	.038	.084	.109	
55	.034	.087	.097	
60	.030	.085		
65	.024	.079		
70	.020	.079		
75	.011	.056		
80	.013			

TABLE 17.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 40^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.738	-0.934	-0.055	0.870	-0.784	-0.097
10	.888	-.844	-.052	1.065	-.680	-.089
15	1.045	-.750	-.049	1.252	-.554	-.098
20	1.171	-.620	-.062	1.410	-.412	-.098
25	1.275	-.489	-.067	1.529	-.261	-.098
30	1.362	-.345	-.063	1.598	-.100	-.097
35	1.417	-.210	-.055	1.615	.036	-.088
40	1.464	-.062	-.051	1.620	.167	-.066
45	1.471	.065	-.040	1.604	.272	-.046
50	1.469	.181	-.028	1.567	.358	-.017
55	1.435	.272	-.012	1.510	.453	-.005
60	1.402	.342	.004	1.479	.566	.014
65	1.362	.411	.024	1.442	.657	.047
70	1.321	.472	.053	1.364	.678	.077
75	1.272	.508	.077			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.039	-0.490	-0.154	1.243	-0.081	-0.231
10	1.319	-.370	-.160	1.567	.057	-.237
15	1.566	-.216	-.169	1.858	.224	-.238
20	1.745	-.042	-.178	2.086	.415	-.248
25	1.886	.124	-.170	2.255	.597	-.248
30	1.837	.269	-.153	2.073	.740	-.236
35	1.819	.405	-.133	1.926	.841	-.199
40	1.756	.504	-.098	1.582	.843	-.165
45	1.690	.589	-.075	1.314	.845	-.157
50	1.625	.664	-.055			
55	1.571	.746	-.027			
60	1.215	.688	-.017			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	0.011	0.037	0.070	0.083
10	.003	.037	.073	.088
15	-.002	.045	.086	.098
20	.005	.051	.105	.112
25	.017	.065	.105	.107
30	.016	.080	.112	.105
35	.023	.080	.124	.104
40	.021	.073	.107	.091
45	.023	.074	.112	.032
50	.023	.077	.098	
55	.020	.072	.105	
60	.014	.070	.078	
65	.005	.054		
70	.001	.061		
75	0			

TABLE 18.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.924	-0.766	-0.126	1.121	-0.577	-0.182
10	1.063	-.656	-.122	1.276	-.456	-.183
15	1.189	-.535	-.133	1.431	-.329	-.172
20	1.291	-.397	-.134	1.563	-.173	-.171
25	1.368	-.260	-.123	1.648	-.011	-.175
30	1.440	-.107	-.127	1.676	.137	-.167
35	1.477	.042	-.125	1.642	.232	-.137
40	1.485	.156	-.109	1.607	.321	-.091
45	1.477	.259	-.096	1.550	.392	-.062
50	1.449	.354	-.067	1.502	.479	-.051
55	1.417	.402	-.040	1.463	.590	-.034
60	1.365	.427	-.010	1.416	.680	-.011
65	1.318	.447	.023	1.364	.736	.014
70	1.280	.485	.057	1.283	.744	.057
75	1.241	.511	.102			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.347	-0.278	-0.245	1.587	0.128	-0.316
10	1.568	-.152	-.249	1.855	.279	-.291
15	1.776	.019	-.248	2.107	.459	-.306
20	1.926	.191	-.239	2.285	.665	-.298
25	1.956	.366	-.219	2.386	.862	-.288
30	1.856	.450	-.193	1.972	.862	-.210
35	1.789	.526	-.135	1.843	.955	-.193
40	1.690	.631	-.114	1.364	.859	-.154
45	1.619	.688	-.087	1.185	.875	-.133
50	1.539	.740	-.045			
55	1.222	.694	-.034			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.004	0.030	0.098	0.120
10	-.007	.042	.107	.136
15	-.009	.040	.115	.133
20	-.004	.048	.117	.132
25	-.001	.035	.124	.131
30	.005	.075	.111	.099
35	.012	.073	.106	.090
40	.015	.060	.094	.034
45	.017	.054	.088	-.010
50	.008	.053	.076	
55	.003	.053	.047	
60	-.011	.051		
65	-.021	.053		
70	-.021	.058		
75	-.023			

TABLE 19.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 0^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.240	-1.147	0.157	0.282	-0.999	0.135
10	.402	-1.114	.171	.475	-.969	.150
15	.555	-1.058	.180	.656	-.910	.176
20	.701	-.983	.197	.828	-.822	.189
25	.855	-.906	.194	.993	-.724	.199
30	.965	-.790	.196	1.129	-.601	.198
35	1.070	-.683	.192	1.246	-.466	.203
40	1.162	-.549	.191	1.336	-.315	.195
45	1.247	-.425	.194	1.413	-.170	.190
50	1.310	-.291	.200	1.457	-.025	.198
55	1.334	-.155	.197	1.488	.110	.200
60	1.366	-.033	.191	1.482	.243	.201
65	1.366	.085	.188	1.462	.352	.201
70	1.363	.201	.195			
75	1.351	.311	.200			
80	1.322	.406	.207			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.335	-0.762	0.097	0.405	-0.361	0.038
10	.552	-.704	.128	.665	-.311	.084
15	.794	-.635	.151	.930	-.238	.109
20	1.015	-.537	.169	1.194	-.135	.137
25	1.221	-.419	.178	1.415	.011	.133
30	1.381	-.270	.186	1.602	.177	.133
35	1.496	-.115	.183	1.431	.336	.044
40	1.614	.059	.176	1.478	.490	.041
45	1.603	.287	.124			
50	1.577	.450	.108			
55	1.471	.531	.107			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.013	0.015	-0.001	-0.024
10	.012	.018	.008	-.018
15	.017	.023	.024	-.004
20	.019	.031	.031	.015
25	.021	.036	.050	.041
30	.030	.058	.072	.069
35	.036	.066	.091	.071
40	.035	.075	.104	.086
45	.042	.075	.120	
50	.042	.083	.118	
55	.042	.084	.107	
60	.045	.089		
65	.048	.096		
70	.038			
75	.024			
80	.001			

TABLE 20.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 20^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.522	-1.052	0.018	0.636	-0.911	-0.007
10	.684	-.987	.028	.826	-.827	-.005
15	.844	-.901	.029	1.023	-.729	-.001
20	.994	-.803	.025	1.203	-.605	-.004
25	1.113	-.674	.025	1.238	-.453	-.013
30	1.235	-.548	.012	1.476	-.293	-.018
35	1.324	-.396	.006	1.557	-.127	-.029
40	1.401	-.246	.008	1.635	.050	-.032
45	1.444	-.094	.004	1.644	.192	-.028
50	1.465	.044	.006	1.633	.317	-.012
55	1.472	.177	.011	1.593	.409	.014
60	1.441	.277	.024	1.525	.475	.049
65	1.416	.358	.040	1.462	.540	.068
70	1.386	.450	.063	1.413	.622	.096
75	1.341	.528	.091			
80	1.310	.621	.131			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.754	-0.630	-0.070	0.888	-0.234	-0.142
10	1.023	-.543	-.073	1.235	-.126	-.144
15	1.275	-.410	-.070	1.559	-.001	-.143
20	1.516	-.264	-.076	1.838	.177	-.151
25	1.695	-.098	-.081	2.083	.374	-.170
30	1.810	.091	-.095	2.185	.591	-.186
35	1.863	.270	-.101	2.195	.786	-.196
40	1.898	.455	-.099	1.797	.862	-.181
45	1.879	.596	-.087	1.521	.870	-.165
50	1.695	.722	-.065			
55	1.542	.763	-.057			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.016	0.033	0.046	0.044
10	.013	.033	.056	.058
15	.007	.036	.072	.071
20	.009	.045	.078	.094
25	.016	.057	.099	.107
30	.025	.073	.125	.146
35	.032	.082	.133	.165
40	.035	.077	.140	.134
45	.028	.075	.140	.111
50	.026	.071	.119	
55	.027	.077	.093	
60	.027	.075		
65	.012	.070		
70	.001	.067		
75	-.010			
80	-.026			

TABLE 21.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 40^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.726	-0.934	-0.051	0.869	-0.771	-0.095
10	.884	-.847	-.052	1.058	-.664	-.093
15	1.026	-.733	-.050	1.252	-.539	-.107
20	1.168	-.616	-.061	1.416	-.399	-.101
25	1.281	-.476	-.072	1.539	-.228	-.106
30	1.369	-.328	-.071	1.644	-.047	-.120
35	1.455	-.167	-.074	1.693	.122	-.125
40	1.495	-.016	-.070	1.709	.277	-.107
45	1.517	.130	-.072	1.691	.395	-.092
50	1.514	.257	-.062	1.637	.486	-.052
55	1.481	.374	-.045	1.563	.533	-.018
60	1.437	.426	-.013	1.492	.589	.005
65	1.391	.473	.013	1.430	.655	.041
70	1.352	.532	.036	1.354	.693	.071
75	1.318	.639	.076			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.042	-0.485	-0.154	1.246	-0.073	-0.240
10	1.328	-.372	-.157	1.578	.056	-.237
15	1.563	-.213	-.168	1.881	.222	-.223
20	1.780	-.035	-.171	2.129	.421	-.237
25	1.933	.161	-.180	2.317	.623	-.249
30	1.964	.356	-.185	2.338	.844	-.267
35	1.994	.524	-.172	2.288	.996	-.248
40	1.966	.676	-.140	2.124	1.134	-.227
45	1.902	.771	-.109	1.394	.907	-.164
50	1.800	.843	-.075	1.236	.940	-.157
55	1.431	.786	-.050			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	0.007	0.040	0.074	0.084
10	0	.038	.086	.108
15	.002	.047	.096	.121
20	.002	.055	.108	.125
25	.008	.067	.120	.143
30	.009	.076	.146	.164
35	.013	.074	.152	.160
40	.009	.072	.152	.152
45	0	.068	.135	.078
50	.002	.067	.115	.043
55	.005	.063	.072	
60	0	.065		
65	-.011	.054		
70	-.012	.051		
75	-.028			

TABLE 22.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.913	-0.760	-0.115	1.086	-0.568	-0.164
10	1.050	-.648	-.116	1.255	-.443	-.173
15	1.136	-.524	-.120	1.396	-.304	-.164
20	1.272	-.388	-.121	1.531	-.150	-.160
25	1.350	-.253	-.111	1.611	.019	-.164
30	1.420	-.097	-.116	1.660	.171	-.162
35	1.462	.061	-.123	1.697	.333	-.154
40	1.494	.281	-.121	1.669	.452	-.130
45	1.500	.354	-.117	1.613	.529	-.094
50	1.473	.452	-.098	1.544	.573	-.049
55	1.428	.509	-.059	1.453	.624	-.030
60	1.364	.507	-.017	1.397	.712	-.019
65	1.312	.515	.019	1.315	.747	.022
70	1.263	.553	.055	1.252	.755	.060
75	1.239	.663	.093			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.316	-0.265	-0.235	1.556	0.142	-0.305
10	1.530	-.135	-.230	1.838	.291	-.289
15	1.737	.030	-.232	2.109	.470	-.298
20	1.889	.222	-.234	2.306	.672	-.296
25	1.964	.410	-.226	2.428	.883	-.308
30	1.980	.570	-.215	2.327	1.051	-.290
35	1.935	.707	-.190	2.172	1.147	-.250
40	1.917	.831	-.160	1.408	.878	-.154
45	1.777	.884	-.106	1.229	.905	-.146
50	1.424	.807	-.080			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	-0.001	0.035	0.097	0.130
10	-.005	.040	.105	.131
15	-.003	.050	.118	.149
20	0	.061	.127	.160
25	0	.068	.141	.172
30	-.002	.065	.147	.170
35	-.001	.063	.143	.153
40	-.007	.050	.134	.080
45	-.008	.040	.119	.051
50	-.004	.037	.061	
55	-.004	.028		
60	-.012	.026		
65	-.004	.035		
70	-.038	.029		
75	-.040			

TABLE 23.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 20^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.428	-1.032	0.048	0.534	-0.885	0.079
10	.610	-.983	.052	.715	-.828	.011
15	.761	-.905	.056	.927	-.735	.014
20	.920	-.814	.051	1.124	-.612	.004
25	1.059	-.700	.046	1.305	-.473	-.016
30	1.189	-.566	.030	1.465	-.319	-.016
35	1.299	-.423	.018	1.548	-.166	-.016
40	1.382	-.267	.017	1.557	-.022	-.013
45	1.421	-.138	.017	1.573	.114	-.014
50	1.437	-.009	.035	1.606	.270	.010
55	1.431	.101	.028	1.591	.385	.032
60	1.414	.211	.042	1.517	.453	.051
65	1.391	.296	.054	1.462	.543	.069
70	1.352	.373	.073	1.382	.572	.100
75	1.307	.446	.100			
80	1.264	.506	.130			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.582	-0.621	-0.039	0.669	-0.243	-0.116
10	.854	-.549	-.048	1.042	-.154	-.129
15	1.176	-.442	-.057	1.446	-.023	-.145
20	1.451	-.288	-.073	1.768	.138	-.153
25	1.668	-.116	-.078	2.051	.321	-.145
30	1.849	.065	-.080	2.229	.529	-.155
35	1.934	.234	-.069	2.375	.733	-.143
40	1.783	.313	-.035	1.882	.746	-.117
45	1.680	.470	-.046	1.549	.755	-.116
50	1.624	.597	-.029			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.031	0.041	0.046	0.047
10	.028	.043	.063	.064
15	.023	.044	.060	.055
20	.021	.052	.061	.052
25	.024	.058	.078	.070
30	.030	.066	.081	.086
35	.038	.080	.094	.089
40	.041	.082	.090	.065
45	.045	.079	.100	.052
50	.051	.073	.090	
55	.050	.071		
60	.054	.064		
65	.035	.069		
70	.010	.067		
75	.001			
80	.017			

TABLE 24.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 40^{\circ}$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.579	-0.953	0	0.674	-0.800	-0.040
10	.755	-.886	-.008	.915	-.720	-.057
15	.913	-.769	-.024	1.135	-.585	-.066
20	1.076	-.653	-.032	1.343	-.430	-.089
25	1.198	-.525	-.054	1.501	-.272	-.098
30	1.325	-.363	-.063	1.615	-.110	-.154
35	1.405	-.217	-.065	1.649	.038	-.088
40	1.457	-.063	-.060	1.629	.154	-.075
45	1.457	.064	-.054	1.611	.253	-.044
50	1.466	.187	-.038	1.623	.409	-.022
55	1.425	.260	-.013	1.565	.481	.008
60	1.386	.326	.009	1.489	.555	.023
65	1.354	.392	.030	1.443	.612	.067
70	1.318	.464	.048	1.353	.634	.089
75	1.275	.508	.083			
80	1.218	.529	.121			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.817	-0.510	-0.105	1.022	-0.119	-0.202
10	1.170	-.409	-.135	1.413	.011	-.224
15	1.489	-.257	-.160	1.794	.190	-.222
20	1.733	-.067	-.166	2.084	.376	-.232
25	1.905	.123	-.170	2.275	.571	-.230
30	2.027	.303	-.153	2.453	.787	-.225
35	2.027	.454	-.131	2.434	.942	-.190
40	1.764	.428	-.050	1.677	.773	-.131
45	1.741	.561	-.052	1.422	.804	-.124
50	1.539	.660	-.054			
55	1.385	.687	-.029			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.024	0.046	0.062	0.075
10	.024	.049	.084	.095
15	.025	.058	.087	.092
20	.028	.063	.097	.088
25	.032	.074	.103	.105
30	.040	.076	.110	.104
35	.045	.086	.107	.100
40	.047	.088	.094	.046
45	.037	.078	.094	.028
50	.031	.068	.067	
55	.026	.062	.051	
60	.024	.068		
65	.009	.060		
70	-.002	.056		
75	.010			
80	.020			

TABLE 25.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.748	-0.830	-0.059	0.922	-0.665	-0.119
10	.914	-.735	-.070	1.145	-.536	-.137
15	1.061	-.621	-.075	1.335	-.378	-.159
20	1.198	-.461	-.097	1.515	-.203	-.167
25	1.312	-.302	-.116	1.618	-.036	-.170
30	1.399	-.137	-.120	1.664	.099	-.155
35	1.450	.011	-.130	1.661	.205	-.124
40	1.450	.115	-.106	1.626	.299	-.097
45	1.459	.246	-.103	1.599	.396	-.058
50	1.435	.340	-.073	1.578	.527	-.040
55	1.396	.383	-.038	1.519	.603	-.021
60	1.334	.384	-.005	1.439	.635	.015
65	1.303	.436	.027	1.375	.693	.045
70	1.273	.502	.064	1.300	.637	.098
75	1.220	.539	.089			
80	1.167	.555	.114			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.115	-0.335	-0.189	1.305	0.068	-0.260
10	1.394	-.210	-.209	1.661	.226	-.286
15	1.683	-.036	-.216	2.040	.452	-.306
20	1.877	.162	-.211	2.320	.678	-.305
25	2.023	.377	-.223	2.417	.870	-.293
30	2.075	.530	-.195	2.508	1.039	-.259
35	1.891	.523	-.131	2.276	1.043	-.172
40	1.636	.462	-.025	1.485	.787	-.112
45	1.646	.638	-.044	1.268	.817	-.104
50	1.366	.673	-.044			
55	1.221	.649	-.007			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.018	0.041	0.083	0.111
10	.021	.050	.094	.114
15	.032	.064	.107	.118
20	.039	.070	.112	.116
25	.036	.075	.112	.118
30	.039	.080	.108	.108
35	.043	.089	.094	.080
40	.043	.076	.074	.014
45	.039	.062	.072	-.013
50	.029	.057	.039	
55	.022	.064	.038	
60	.008	.059		
65	.005	.054		
70	.012	.054		
75	.021			
80	.011			

TABLE 26.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 20^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.434	-1.027	0.046	0.497	-0.893	0.017
10	.603	-.975	.053	.711	-.827	.022
15	.768	-.900	.051	.922	-.737	.012
20	.923	-.802	.045	1.141	-.626	.004
25	1.063	-.692	.038	1.330	-.475	-.012
30	1.190	-.559	.023	1.478	-.308	-.015
35	1.306	-.410	.007	1.580	-.130	-.024
40	1.387	-.253	.005	1.643	.038	-.038
45	1.433	-.107	.001	1.681	.196	-.032
50	1.467	.038	.003	1.675	.329	-.010
55	1.464	.165	.006	1.617	.423	.022
60	1.439	.257	.016	1.544	.468	.045
65	1.405	.339	.045	1.479	.539	.067
70	1.365	.412	.068	1.411	.600	.099
75	1.333	.487	.090			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.582	-0.616	-0.046	0.679	-0.247	-0.116
10	.857	-.541	-.052	1.055	-.149	-.135
15	1.190	-.421	-.055	1.460	-.009	-.149
20	1.468	-.269	-.082	1.798	.156	-.151
25	1.680	-.097	-.083	2.068	.339	-.149
30	1.881	.089	-.085	2.232	.556	-.160
35	1.972	.279	-.088	2.362	.760	-.155
40	1.970	.458	-.082	1.845	.758	-.138
45	1.889	.617	-.063	1.670	.844	-.136
50	1.751	.726	-.050			
55	1.555	.742	-.030			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.033	0.051	0.052	0.049
10	.030	.047	.068	.080
15	.023	.051	.071	.069
20	.023	.055	.080	.078
25	.024	.062	.088	.083
30	.033	.073	.095	.083
35	.032	.084	.108	.089
40	.032	.079	.123	.054
45	.028	.072	.118	.085
50	.026	.073	.115	
55	.023	.071	.075	
60	.025	.071		
65	.018	.077		
70	-.002	.071		
75	-.010			

TABLE 27.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 40^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.564	-0.943	0.006	0.689	-0.797	-0.043
10	.734	-.867	.004	.899	-.700	-.058
15	.913	-.767	-.012	1.137	-.575	-.073
20	1.061	-.649	-.024	1.362	-.419	-.095
25	1.200	-.508	-.046	1.523	-.250	-.103
30	1.324	-.353	-.056	1.633	-.069	-.111
35	1.418	-.189	-.062	1.691	.104	-.116
40	1.472	-.023	-.068	1.717	.265	-.105
45	1.490	.107	-.061	1.701	.403	-.089
50	1.500	.247	-.055	1.666	.500	-.059
55	1.468	.358	-.041	1.579	.544	-.006
60	1.420	.398	-.004	1.489	.559	.032
65	1.378	.447	.023	1.418	.609	.056
70	1.347	.516	.050	1.347	.651	.087
75	1.324	.585	.093			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.818	-0.511	-0.105	0.993	-0.104	-0.185
10	1.151	-.390	-.132	1.405	.026	-.194
15	1.479	-.231	-.154	1.812	.186	-.226
20	1.724	-.046	-.160	2.091	.384	-.222
25	1.915	.140	-.166	2.292	.584	-.215
30	2.045	.332	-.160	2.414	.831	-.240
35	2.101	.513	-.152	2.456	1.012	-.218
40	2.054	.672	-.125	1.747	.829	-.138
45	1.975	.768	-.090	1.562	.894	-.127
50	1.902	.852	-.047			
55	1.439	.725	-.019			
60	1.314	.743	.007			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.023	0.043	0.065	0.083
10	.023	.047	.085	.114
15	.024	.061	.095	.112
20	.026	.062	.103	.114
25	.035	.069	.117	.113
30	.035	.077	.126	.101
35	.033	.078	.127	.102
40	.027	.064	.136	.077
45	.018	.063	.123	.076
50	.013	.057	.098	
55	.012	.059	.059	
60	.007	.057	.038	
65	-.003	.055		
70	-.011	.054		
75	-.029			

TABLE 28.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.715	-0.822	-0.057	0.907	-0.641	-0.096
10	.885	-.725	-.063	1.124	-.501	-.115
15	1.032	-.606	-.081	1.325	-.336	-.151
20	1.177	-.435	-.109	1.487	-.166	-.157
25	1.291	-.291	-.127	1.606	-.004	-.162
30	1.393	-.110	-.132	1.685	.155	-.151
35	1.454	.052	-.143	1.716	.317	-.149
40	1.487	.205	-.138	1.719	.476	-.137
45	1.482	.325	-.125	1.649	.554	-.099
50	1.451	.441	-.113	1.592	.601	-.048
55	1.408	.485	-.077	1.492	.628	-.018
60	1.345	.484	-.029	1.400	.664	.013
65	1.304	.496	.015	1.346	.679	.055
70	1.277	.553	.055	1.267	.660	.098
75	1.256	.637	.099			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.113	-0.313	-0.194	1.298	0.081	-0.266
10	1.410	-.173	-.210	1.672	.226	-.268
15	1.665	-.006	-.210	2.057	.431	-.298
20	1.879	.199	-.231	2.297	.661	-.288
25	2.002	.383	-.218	2.441	.866	-.289
30	2.077	.572	-.207	2.489	1.063	-.266
35	2.060	.719	-.183	2.390	1.170	-.210
40	2.008	.846	-.145	1.564	.864	-.125
45	1.898	.912	-.102	1.392	.917	-.109
50	1.423	.726	-.050			
55	1.263	.692	-.017			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.019	0.048	0.079	0.116
10	.023	.055	.098	.127
15	.028	.073	.112	.141
20	.036	.076	.123	.139
25	.037	.074	.124	.137
30	.034	.077	.131	.100
35	.033	.074	.138	.094
40	.028	.058	.128	.057
45	.027	.048	.108	.045
50	.024	.041	.040	
55	.013	.031	.030	
60	-.005	.044		
65	-.010	.041		
70	-.023	.044		
75	-.035			

TABLE 29.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, FULL-SPAN SLAT WITH FENCES ON, AND $\delta_f = 20^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.417	-1.013	0.038	0.497	-0.886	0.008
10	.589	-.966	.041	.697	-.828	.012
15	.756	-.898	.039	.924	-.741	.004
20	.913	-.797	.029	1.144	-.615	-.005
25	1.057	-.681	.032	1.327	-.466	-.023
30	1.185	-.549	.018	1.470	-.307	-.024
35	1.297	-.408	0	1.581	-.131	-.030
40	1.379	-.254	-.004	1.639	.045	-.031
45	1.425	-.107	-.008	1.677	.198	-.025
50	1.462	.039	-.002	1.665	.325	-.003
55	1.457	.161	.007	1.631	.422	.029
60	1.428	.248	.026	1.543	.482	.058
65	1.391	.328	.044	1.472	.542	.077
70	1.365	.416	.060	1.407	.612	.097
75	1.334	.498	.096	1.338	.646	.124
80	1.304	.574	.146			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.541	-0.620	-0.038	0.592	-0.252	-0.095
10	.828	-.558	-.056	1.008	-.150	-.142
15	1.175	-.435	-.069	1.445	-.022	-.145
20	1.470	-.277	-.074	1.779	.149	-.144
25	1.681	-.107	-.072	2.090	.330	-.133
30	1.882	.080	-.073	2.258	.562	-.149
35	1.994	.271	-.064	2.381	.778	-.140
40	1.988	.461	-.063	2.386	.976	-.127
45	1.970	.607	-.045	2.301	1.118	-.106
50	1.938	.730	-.017	2.195	1.206	-.067
55	1.882	.836	.021	1.772	1.054	-.013
60	1.755	.901	.058			
65	1.616	.914	.069			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.031	0.049	0.053	0.045
10	.030	.051	.069	.078
15	.025	.049	.072	.063
20	.025	.056	.081	.081
25	.026	.065	.093	.079
30	.031	.074	.096	.077
35	.036	.086	.114	.088
40	.033	.081	.130	.116
45	.033	.073	.124	.117
50	.027	.072	.108	.111
55	.026	.074	.095	.073
60	.022	.071	.078	
65	.014	.069	.064	
70	0	.069		
75	-.015	.053		
80	-.017			

TABLE 30.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, FULL-SPAN SLAT WITH FENCES ON, AND $\delta_f = 40^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.527	-0.947	-0.003	0.631	-0.793	-0.040
10	.706	-.877	-.003	.874	-.704	-.058
15	.897	-.779	-.017	1.121	-.577	-.079
20	1.043	-.653	-.029	1.339	-.417	-.096
25	1.198	-.522	-.051	1.496	-.245	-.106
30	1.307	-.358	-.065	1.623	-.073	-.112
35	1.397	-.193	-.071	1.676	.101	-.117
40	1.470	-.036	-.070	1.712	.264	-.105
45	1.490	.110	-.066	1.697	.392	-.083
50	1.500	.240	-.054	1.653	.481	-.046
55	1.465	.349	-.037	1.591	.550	-.010
60	1.410	.393	-.003	1.501	.573	.039
65	1.372	.446	.025	1.420	.623	.061
70	1.340	.519	.072	1.342	.656	.083
75	1.313	.596	.093			
80	1.271	.601	.160			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.756	-0.514	-0.102	0.893	-0.122	-0.181
10	1.115	-.399	-.187	1.348	.021	-.205
15	1.452	-.242	-.161	1.777	.188	-.228
20	1.719	-.055	-.160	2.078	.381	-.218
25	1.901	.131	-.157	2.285	.581	-.203
30	2.040	.326	-.146	2.389	.815	-.228
35	2.066	.508	-.134	2.460	1.009	-.193
40	2.036	.664	-.109	2.382	1.172	-.154
45	1.967	.769	-.075	2.238	1.249	-.120
50	1.904	.858	-.037	2.084	1.293	-.059
55	1.802	.925	.005	1.490	1.002	-.017
60	1.633	.922	.044			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.027	0.045	0.059	0.074
10	.024	.048	.082	.105
15	.024	.059	.090	.102
20	.025	.065	.104	.106
25	.030	.073	.113	.110
30	.030	.079	.119	.099
35	.032	.083	.130	.100
40	.028	.069	.135	.114
45	.016	.066	.120	.106
50	.013	.062	.101	.088
55	.011	.058	.074	.021
60	.005	.056	.051	
65	-.004	.059		
70	-.013	.060		
75	-.027			
80	-.042			

TABLE 31.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, FULL-SPAN SLAT WITH FENCES ON, AND $\delta_f = 60^o$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s}$ = 0.90			$C_{T,s}$ = 0.80		
5	0.667	-0.840	-0.056	0.836	-0.661	-0.100
10	.863	-.740	-.063	1.100	-.517	-.133
15	1.032	-.592	-.093	1.308	-.350	-.167
20	1.166	-.450	-.110	1.485	-.178	-.169
25	1.294	-.285	-.134	1.603	-.013	-.170
30	1.382	-.118	-.140	1.671	.147	-.172
35	1.452	.045	-.138	1.698	.303	-.149
40	1.471	.190	-.137	1.697	.452	-.142
45	1.466	.320	-.124	1.644	.535	-.099
50	1.446	.422	-.110	1.576	.586	-.055
55	1.395	.468	-.068	1.491	.636	-.029
60	1.346	.476	-.029	1.396	.667	.003
65	1.313	.502	-.020	1.343	.680	.048
70	1.279	.541	.060	1.273	.678	.088
75	1.259	.634	.100	1.208	.669	.130
80	1.243	.547	.184			
	$C_{T,s}$ = 0.60			$C_{T,s}$ = 0.30		
5	1.054	-0.348	-0.178	1.190	0.044	-0.241
10	1.356	-.200	-.203	1.602	.205	-.267
15	1.650	-.012	-.208	2.009	.427	-.277
20	1.869	.019	-.221	2.287	.670	-.280
25	2.005	.389	-.217	2.445	.881	-.275
30	2.076	.570	-.198	2.481	1.080	-.258
35	2.055	.714	-.162	2.428	1.210	-.195
40	1.998	.853	-.136	2.233	1.249	-.136
45	1.909	.928	-.095	2.070	1.269	-.091
50	1.810	.963	-.034			
55	1.666	.957	.013			
60	1.530	.955	.045			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s}$ = 0.90	$C_{T,s}$ = 0.80	$C_{T,s}$ = 0.60	$C_{T,s}$ = 0.30
5	0.022	0.044	0.074	-0.070
10	.022	.056	.100	-.069
15	.030	.072	.113	-.068
20	.039	.071	.119	-.066
25	.040	.079	.127	-.064
30	.037	.073	.130	-.061
35	.031	.075	.141	-.058
40	.028	.058	.126	-.056
45	.030	.045	.113	-.054
50	.026	.036	.086	
55	.007	.034	.052	
60	-.007	.037	.040	
65	-.014	.038		
70	-.021	.040		
75	-.033	.035		
80	-.056			

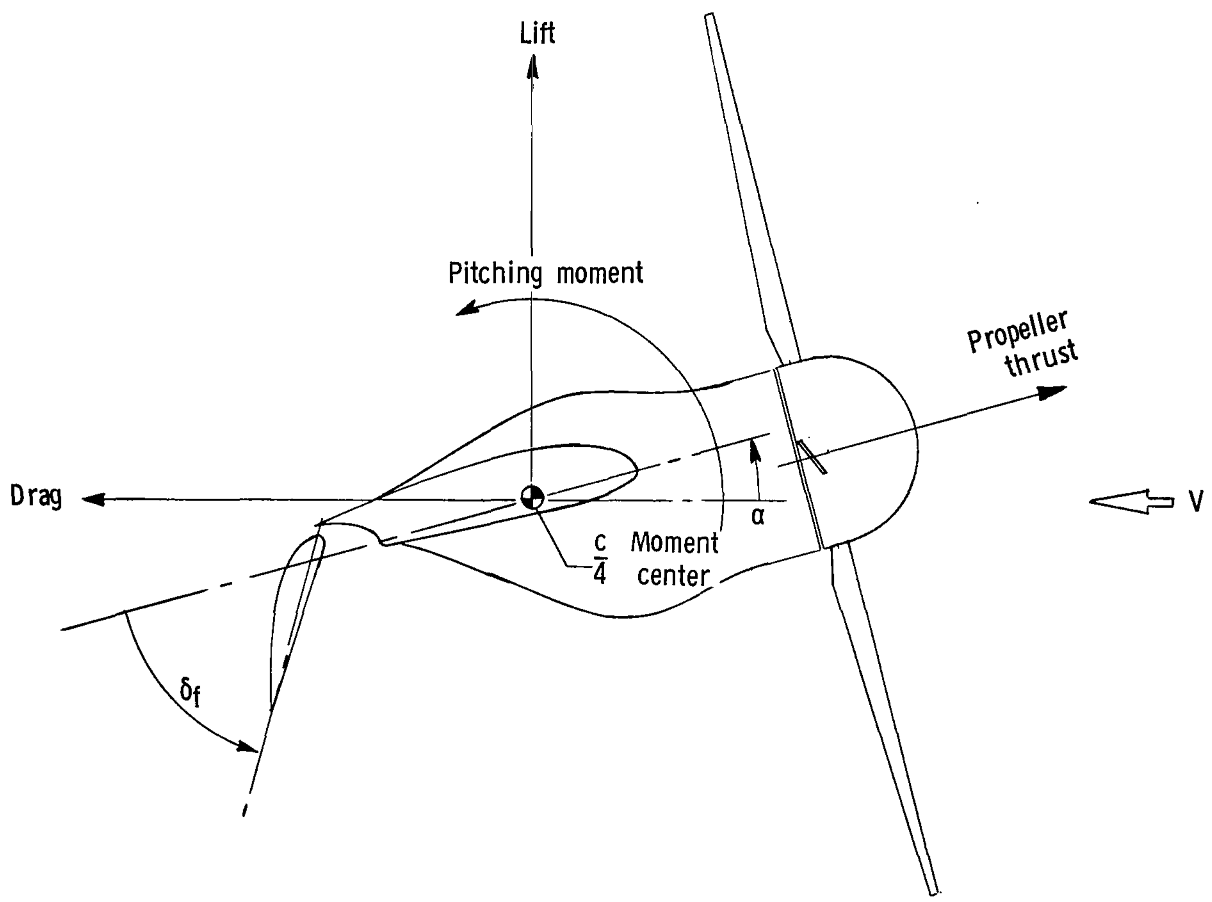
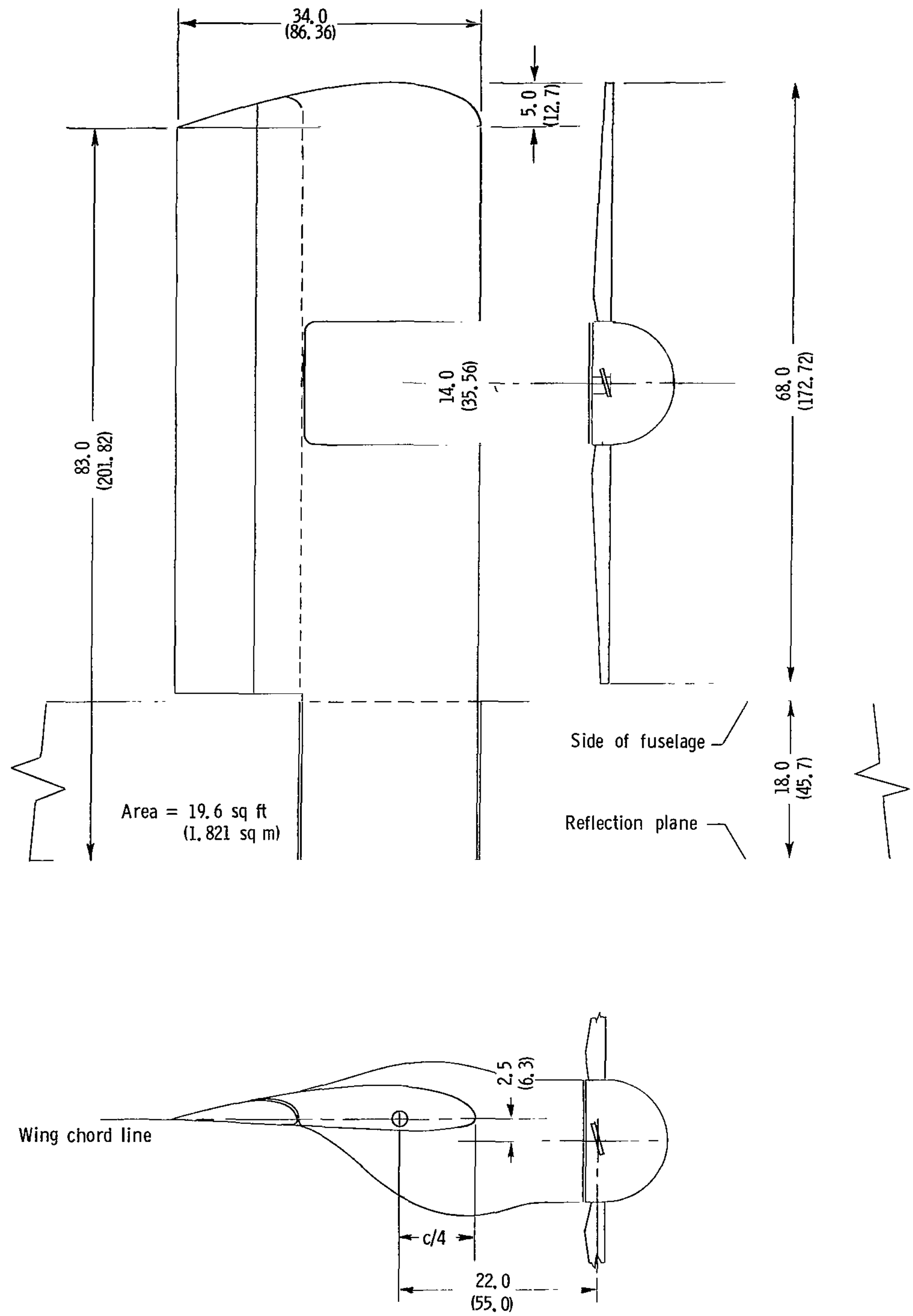
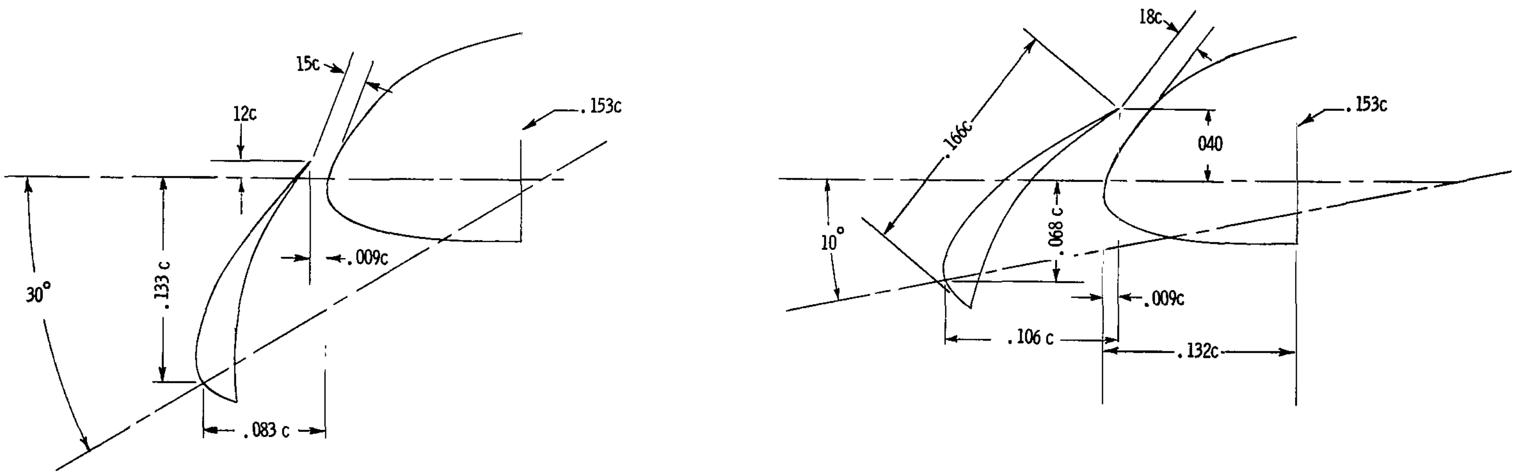


Figure 1.- The positive sense of forces, moments, and angles.



(a) Principal dimensions are in inches; numbers in parentheses are in centimeters unless otherwise noted.

Figure 2.- Principal dimensions of model, propeller blade-form curves, and sketch showing model mounted in tunnel.

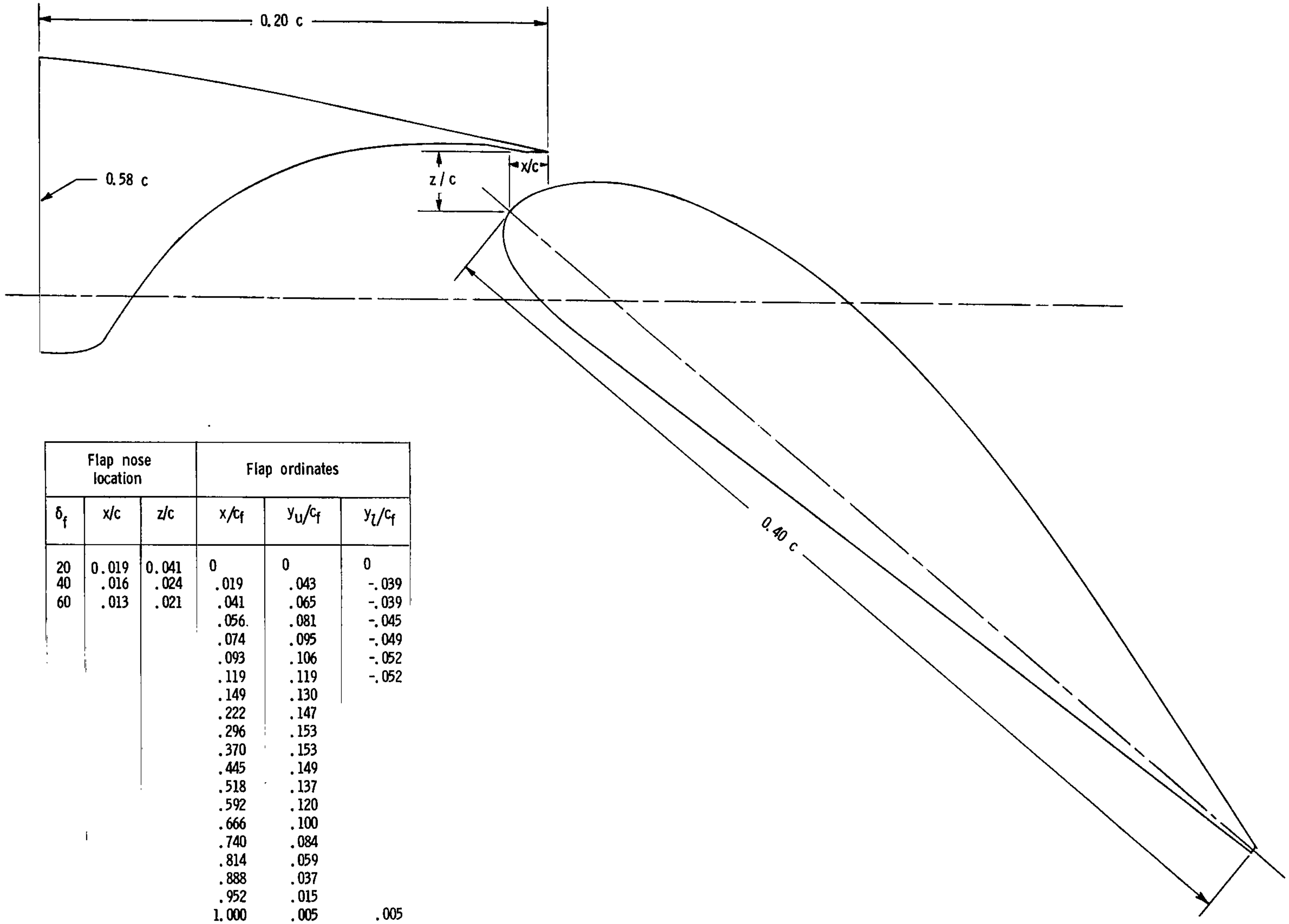


Leading-edge slat position

Slat position over fuselage

(b) Sectional views of leading-edge slat configuration.

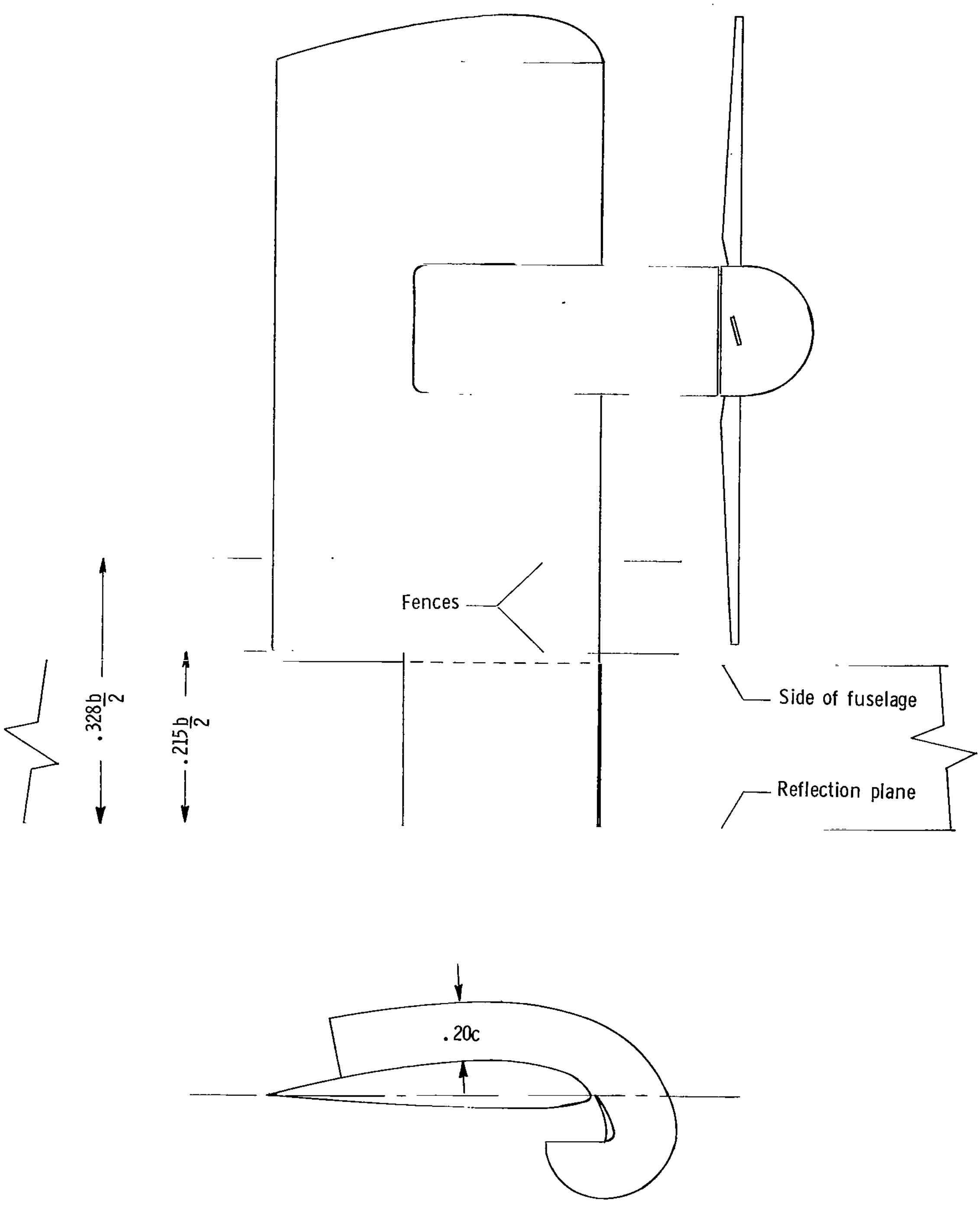
Figure 2.- Continued.



Flap nose location			Flap ordinates		
δ_f	x/c	z/c	x/c_f	y_u/c_f	y_l/c_f
20	0.019	0.041	0	0	0
40	.016	.024	.019	.043	-.039
60	.013	.021	.041	.065	-.039
			.056	.081	-.045
			.074	.095	-.049
			.093	.106	-.052
			.119	.119	-.052
			.149	.130	
			.222	.147	
			.296	.153	
			.370	.153	
			.445	.149	
			.518	.137	
			.592	.120	
			.666	.100	
			.740	.084	
			.814	.059	
			.888	.037	
			.952	.015	
			1.000	.005	.005

(c) Sectional view of trailing-edge flap.

Figure 2.- Continued.



(d) Sectional view and location of fences.

Figure 2.- Concluded.

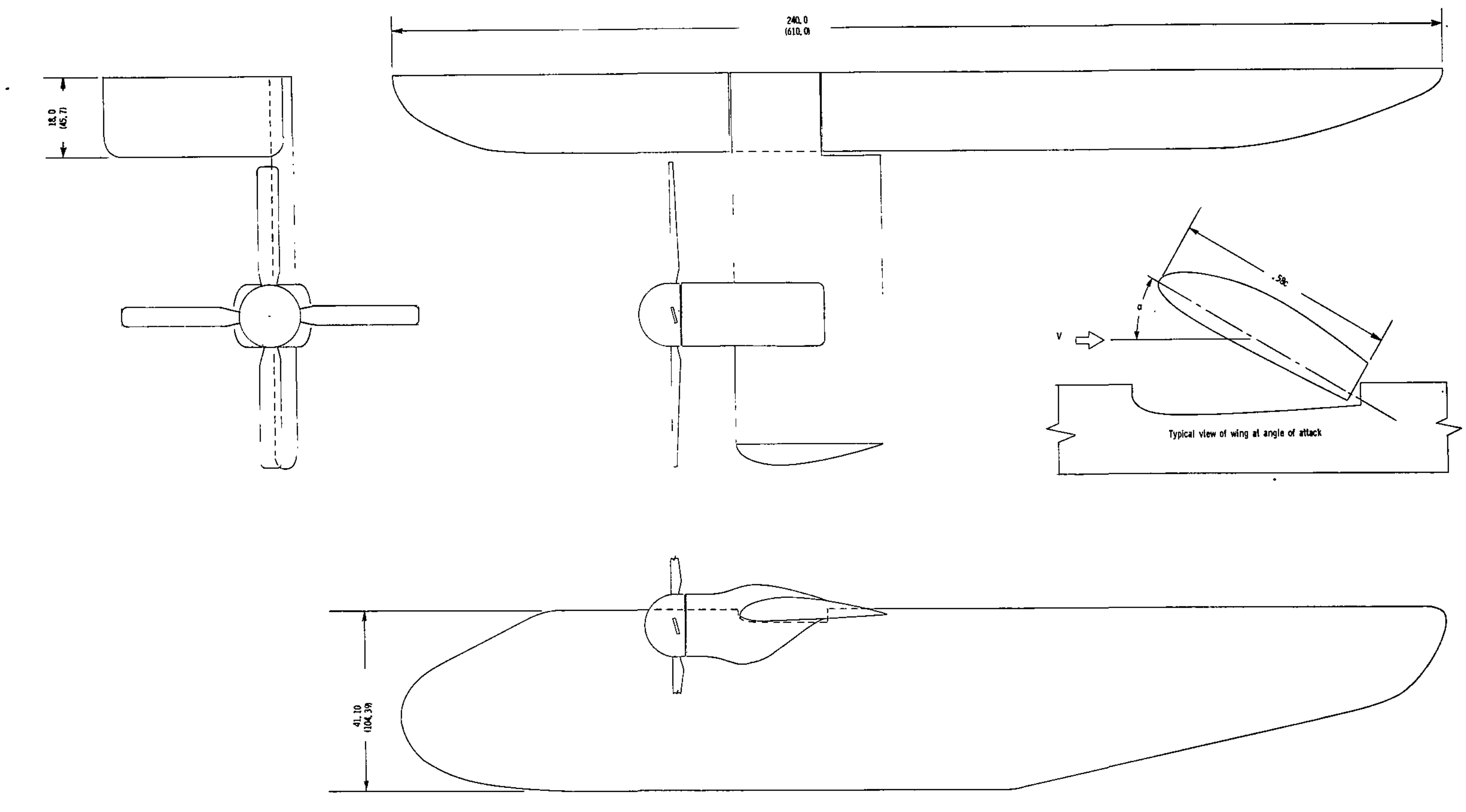


Figure 3.- Three-view drawing of model. Principal dimensions are in inches; numbers in parentheses are in centimeters.

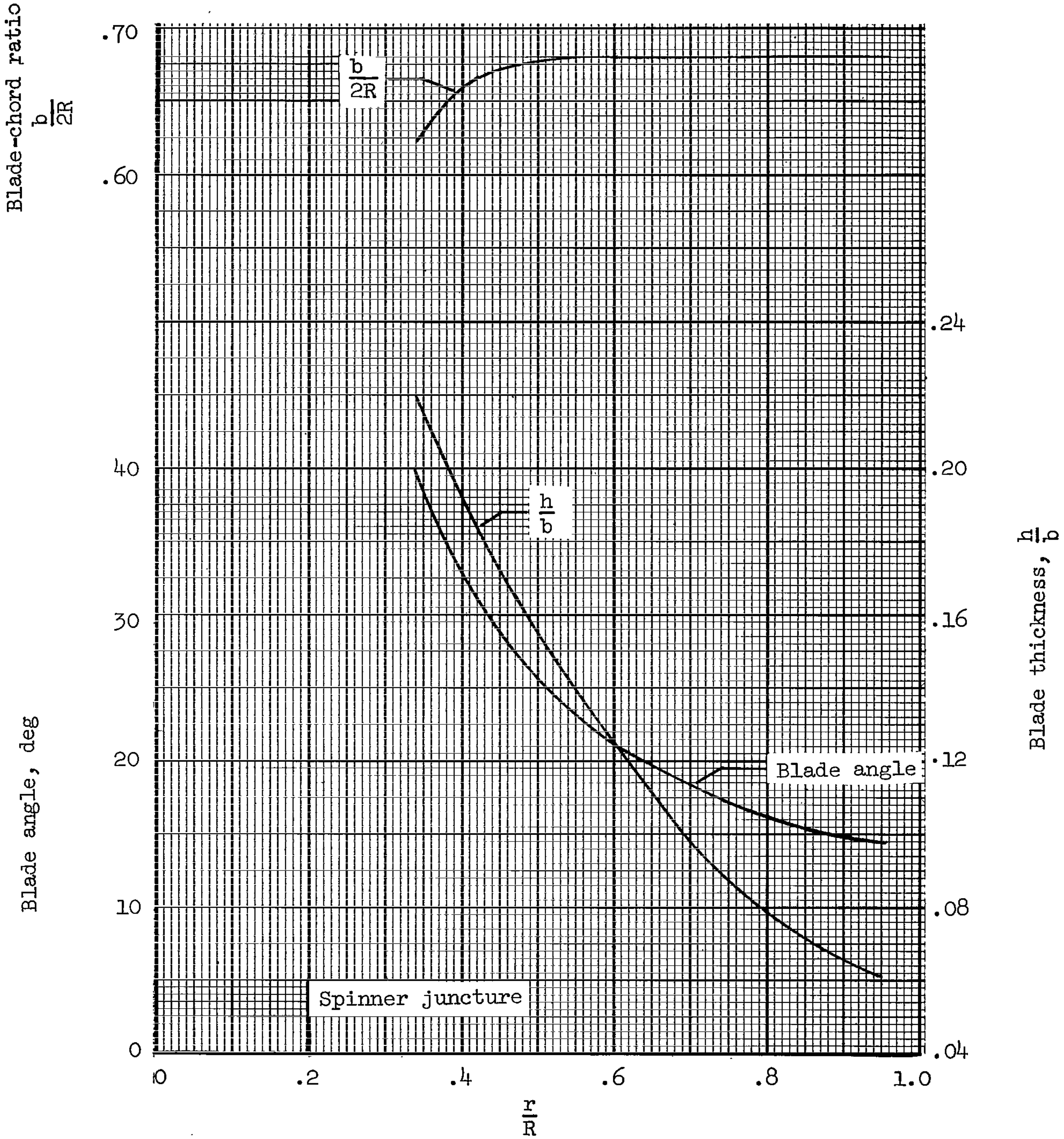


Figure 4.- Propeller blade-form curves.

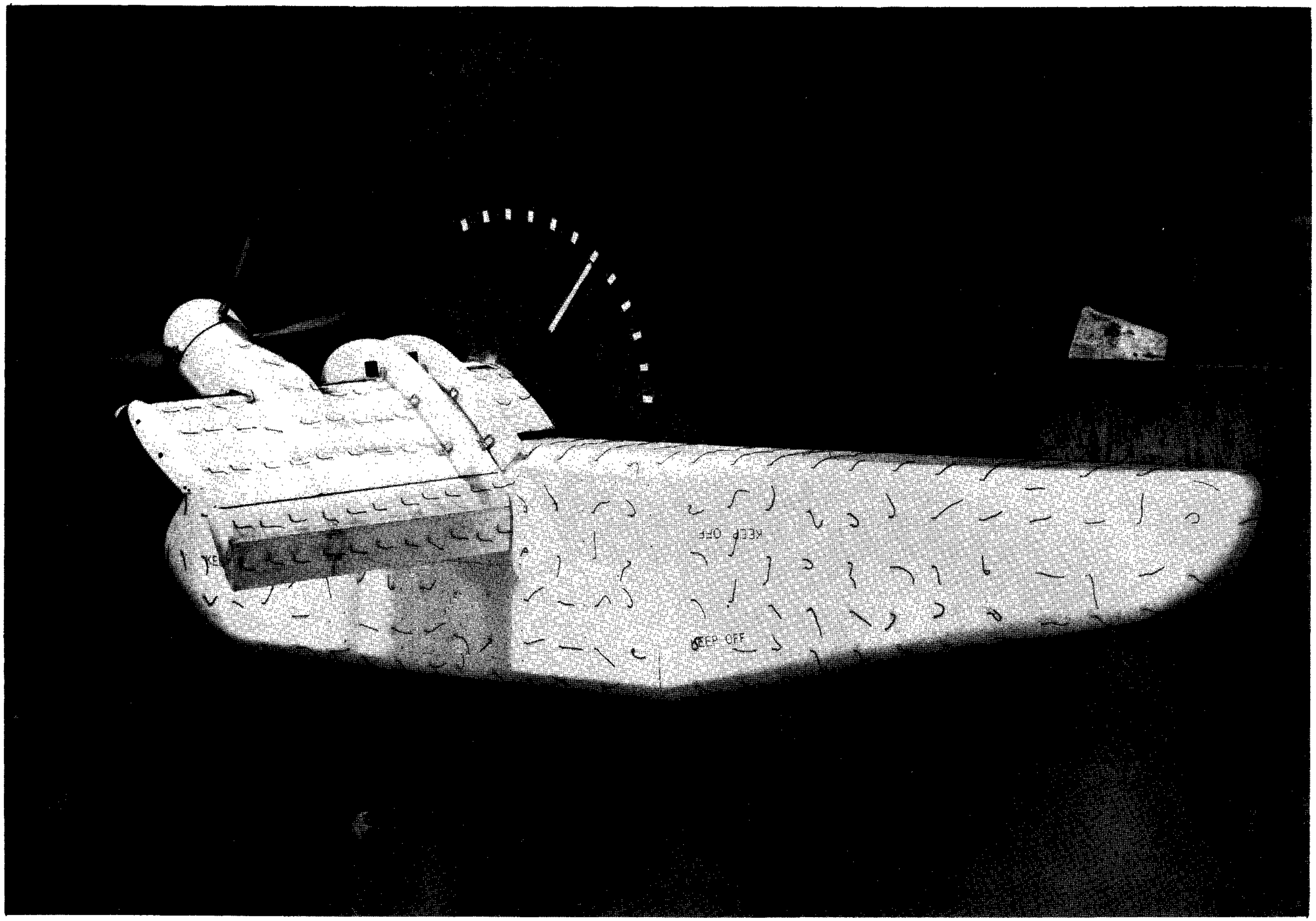
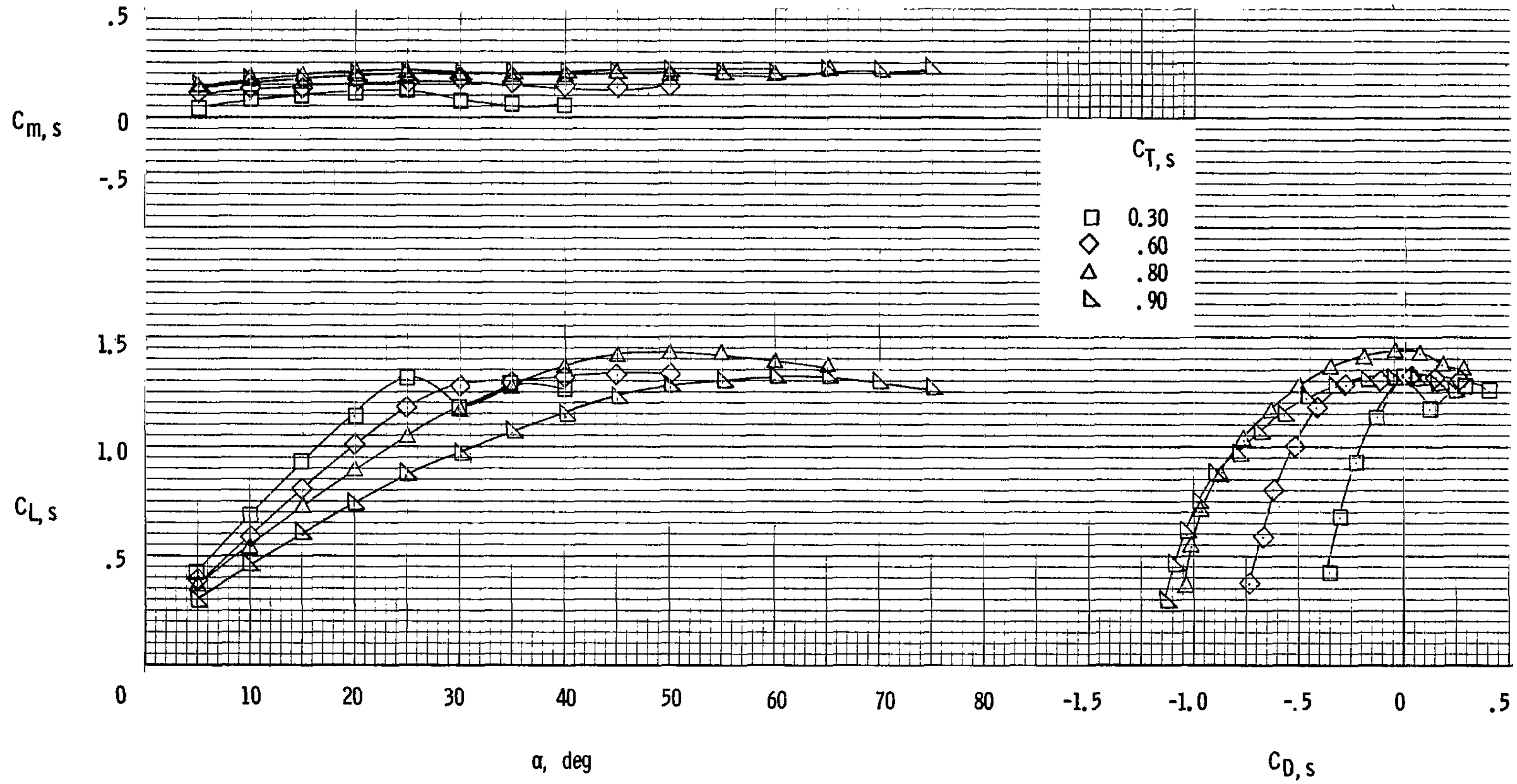
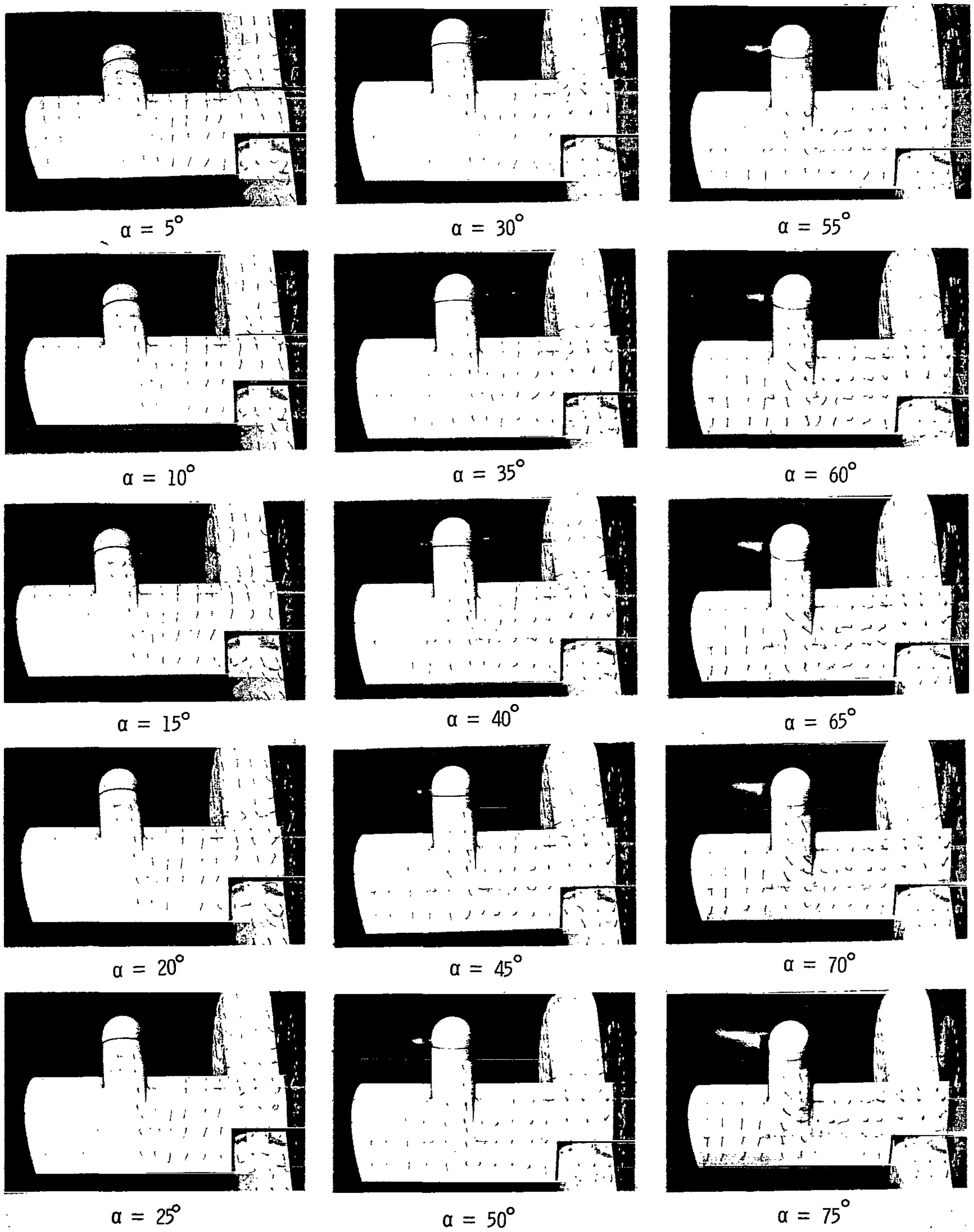


Figure 5.- Photograph of model. L-67-1003



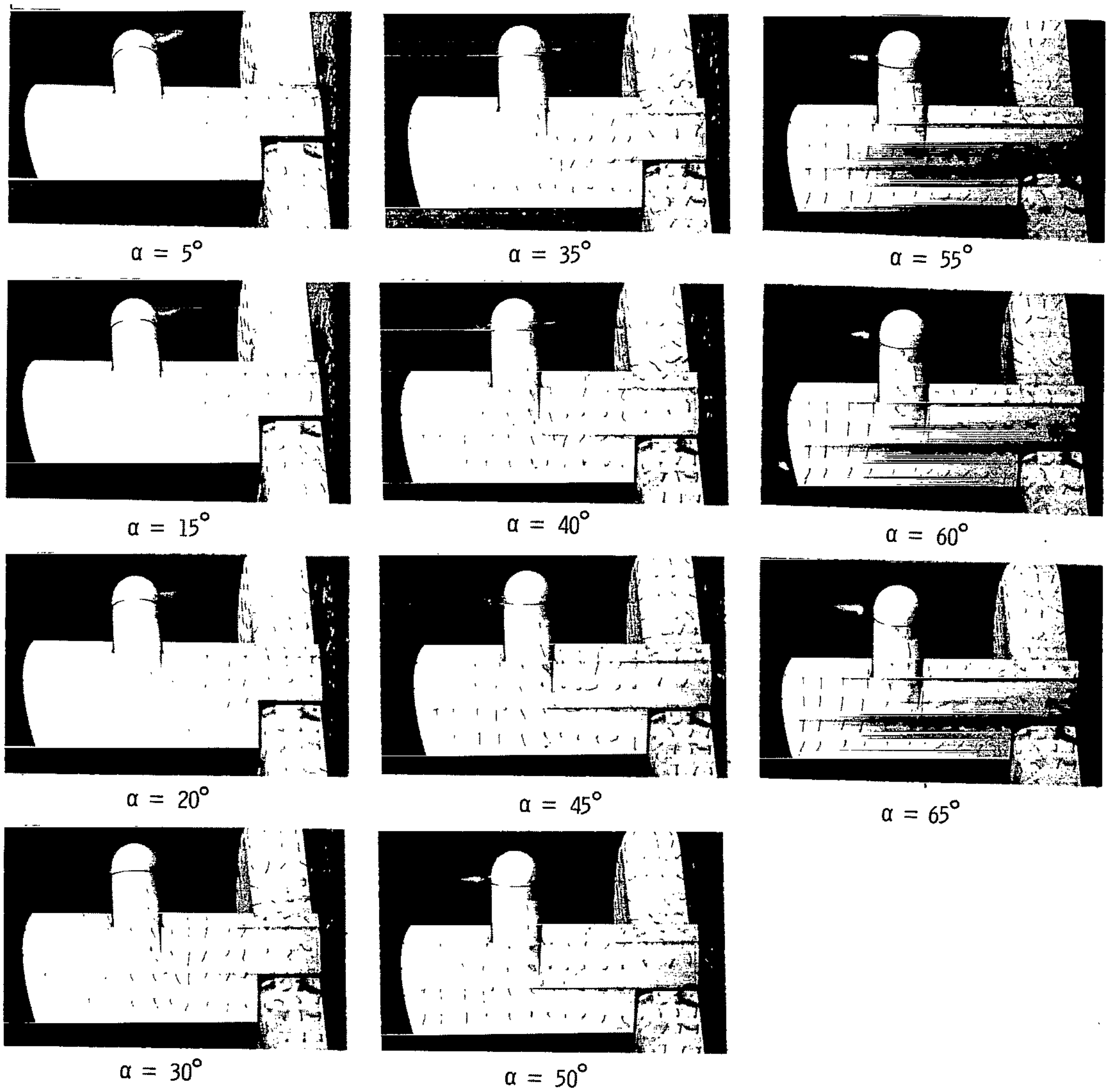
(a) Aerodynamic characteristics.

Figure 6.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Basic leading edge; $\delta_f = 0^o$.



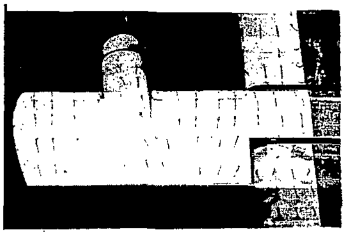
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 6.- Continued.

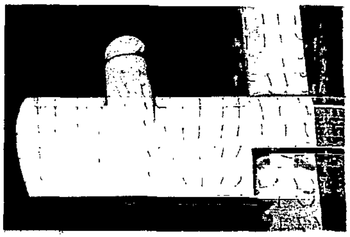


(c) Flow characteristics; $C_{T,s} = 0.80$.

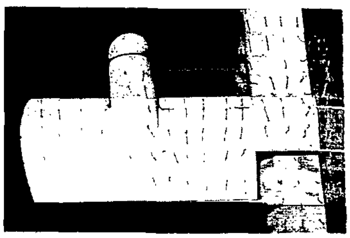
Figure 6.- Continued.



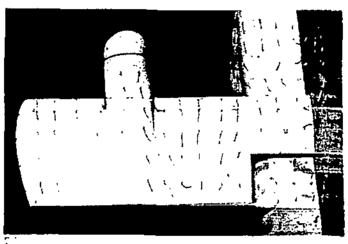
$\alpha = 5^\circ$



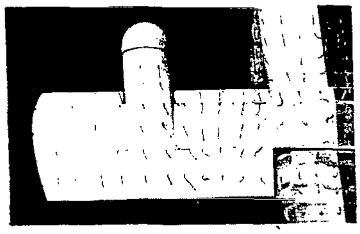
$\alpha = 10^\circ$



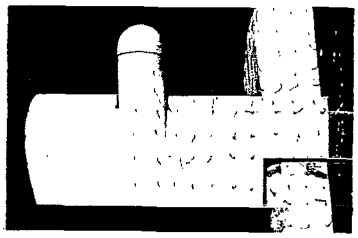
$\alpha = 15^\circ$



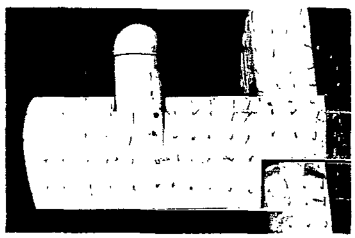
$\alpha = 20^\circ$



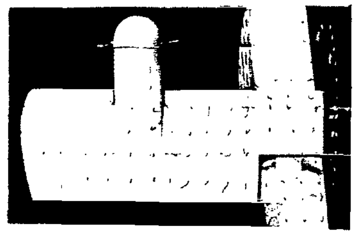
$\alpha = 25^\circ$



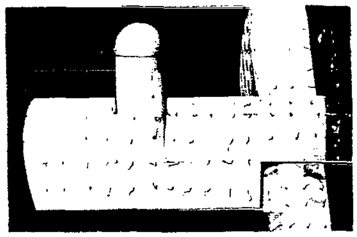
$\alpha = 30^\circ$



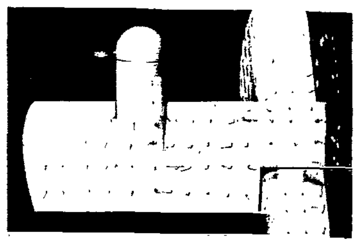
$\alpha = 35^\circ$



$\alpha = 40^\circ$



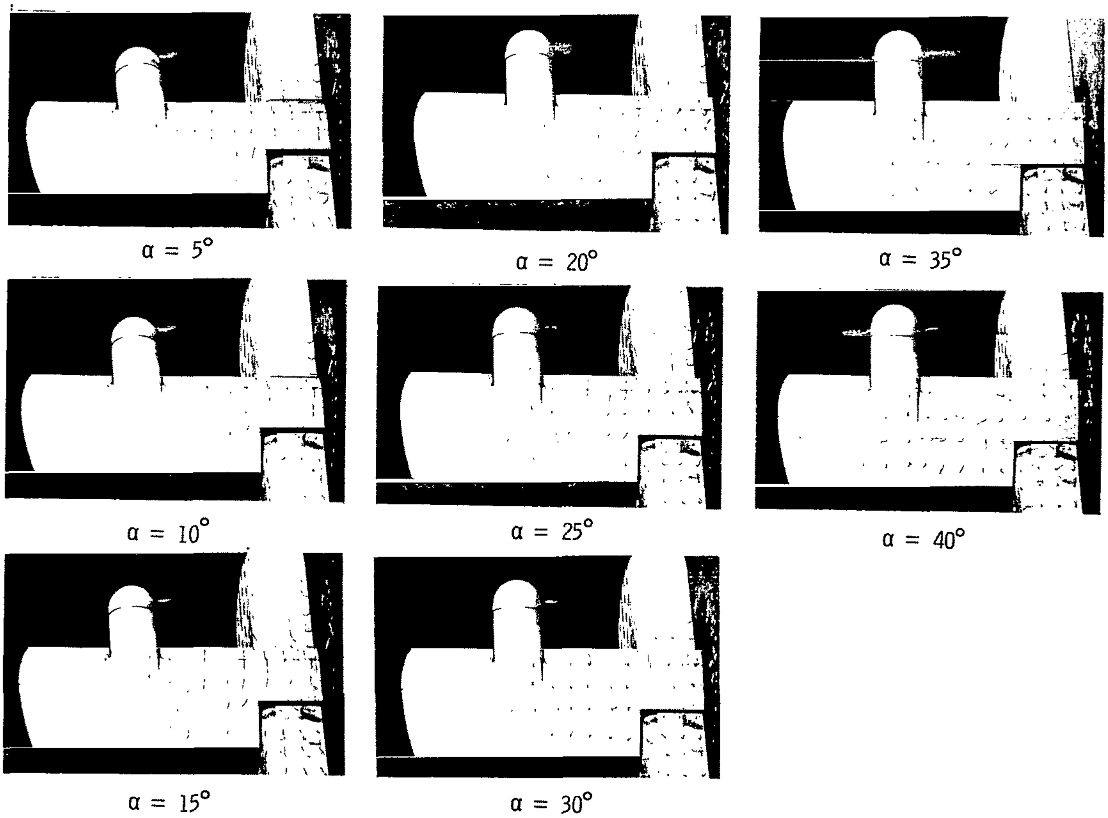
$\alpha = 45^\circ$



$\alpha = 50^\circ$

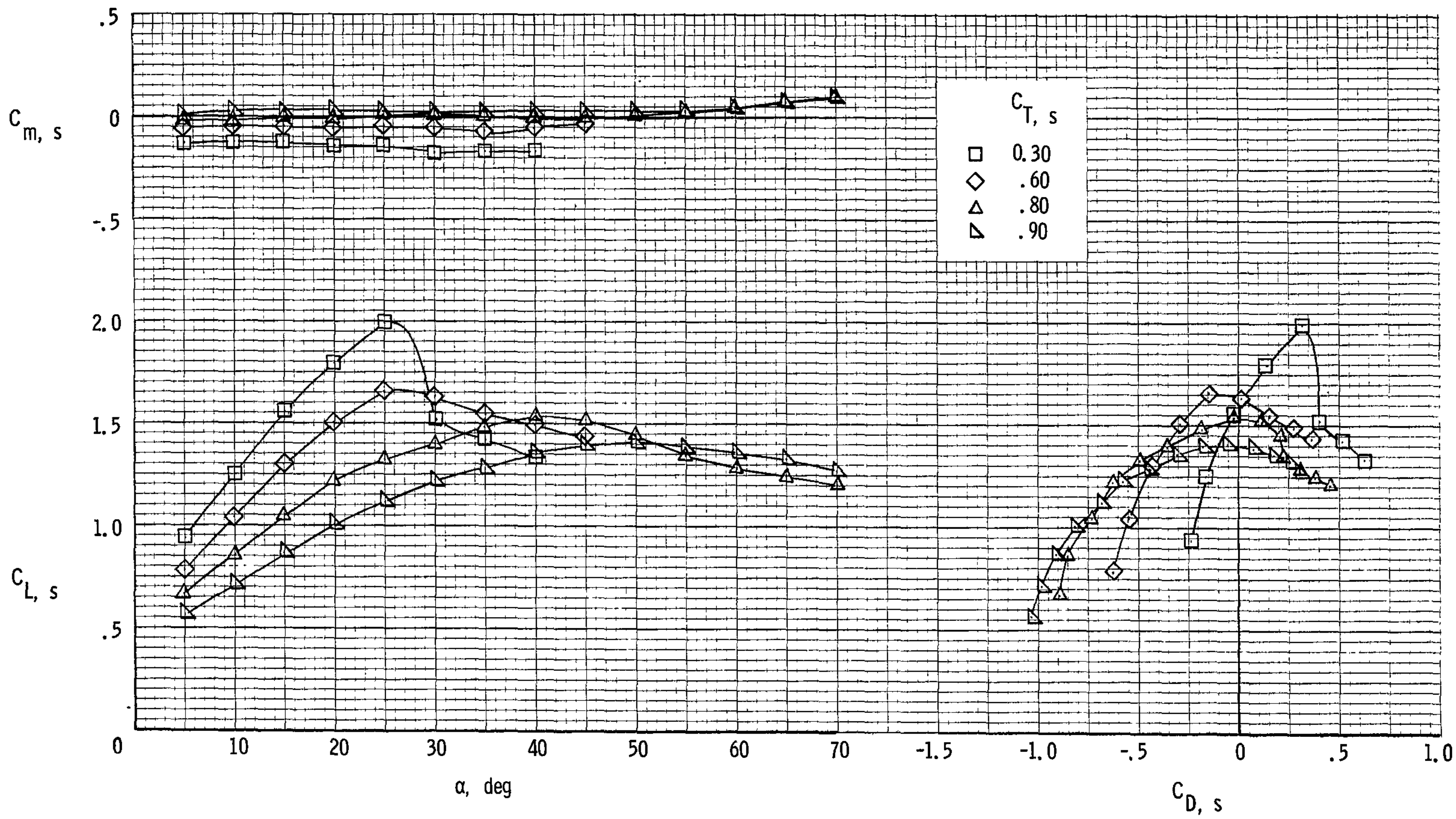
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 6.- Continued.



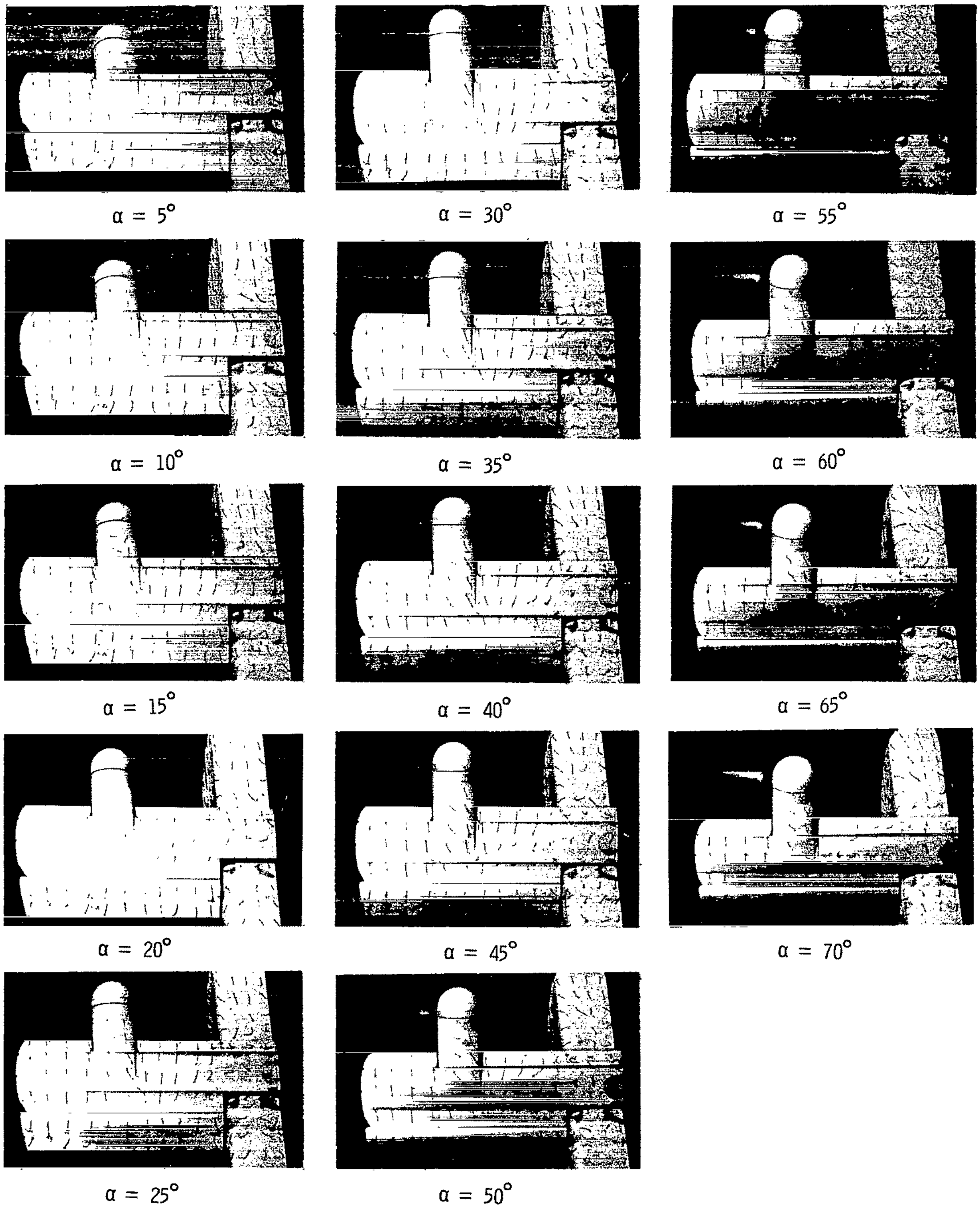
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 6.- Concluded.



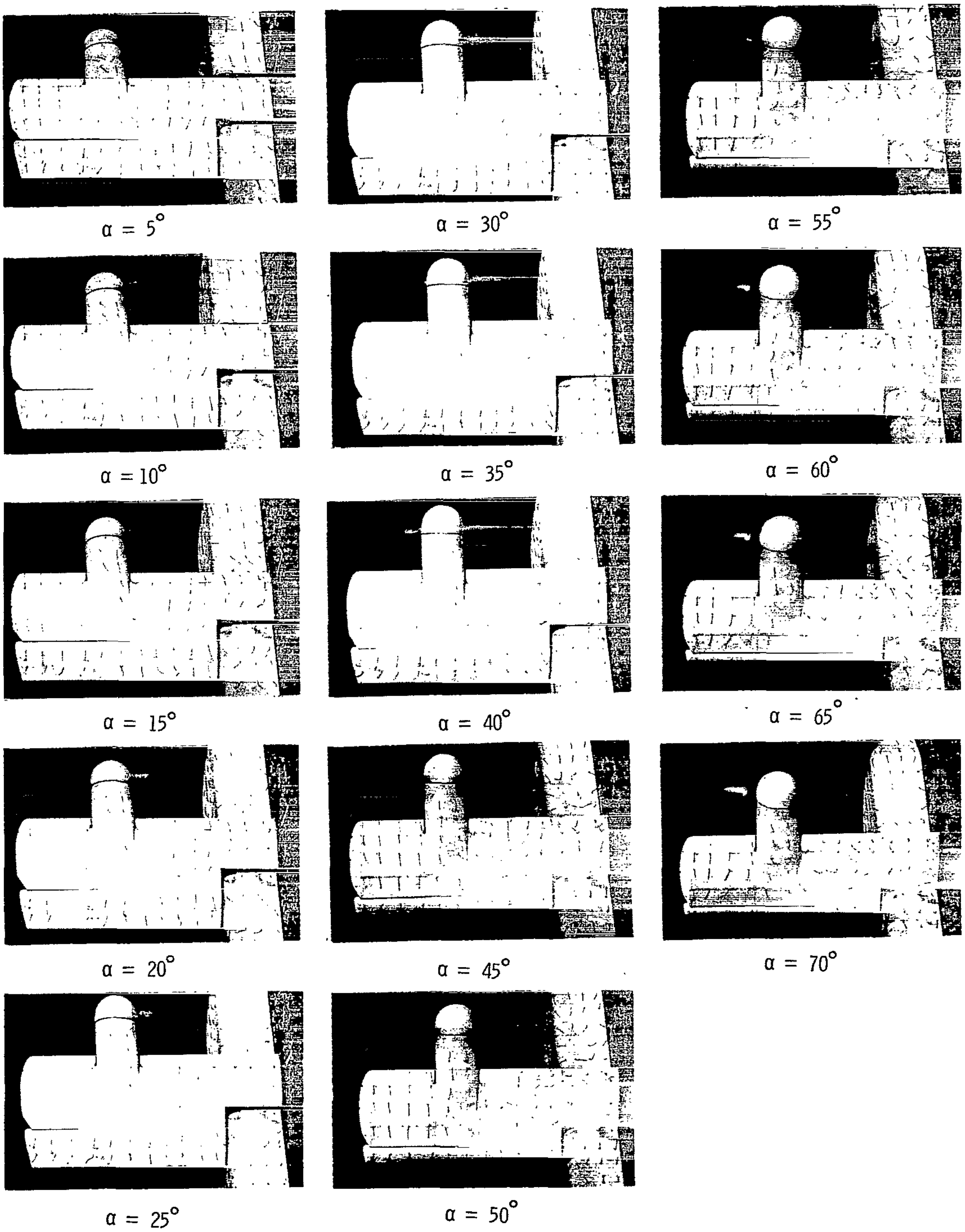
(a) Aerodynamic characteristics.

Figure 7.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Basic leading edge; $\delta_f = 20^0$.



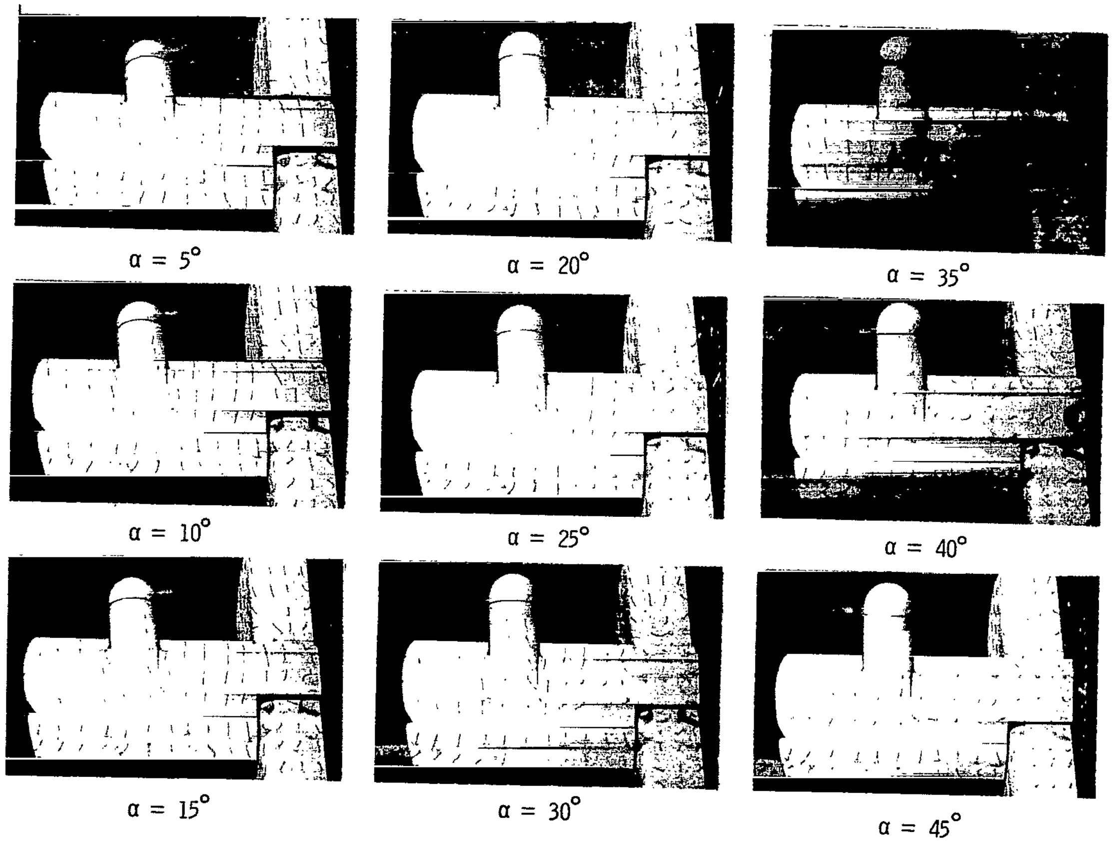
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 7.- Continued.



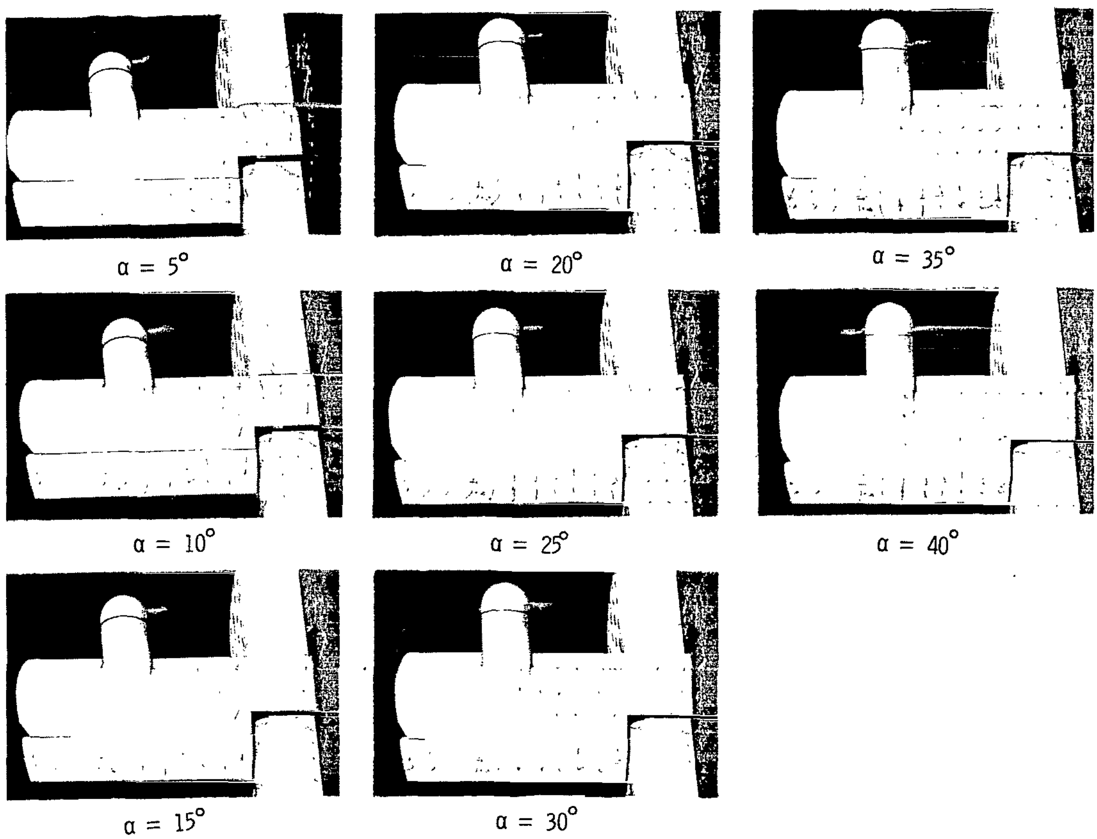
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 7.- Continued.



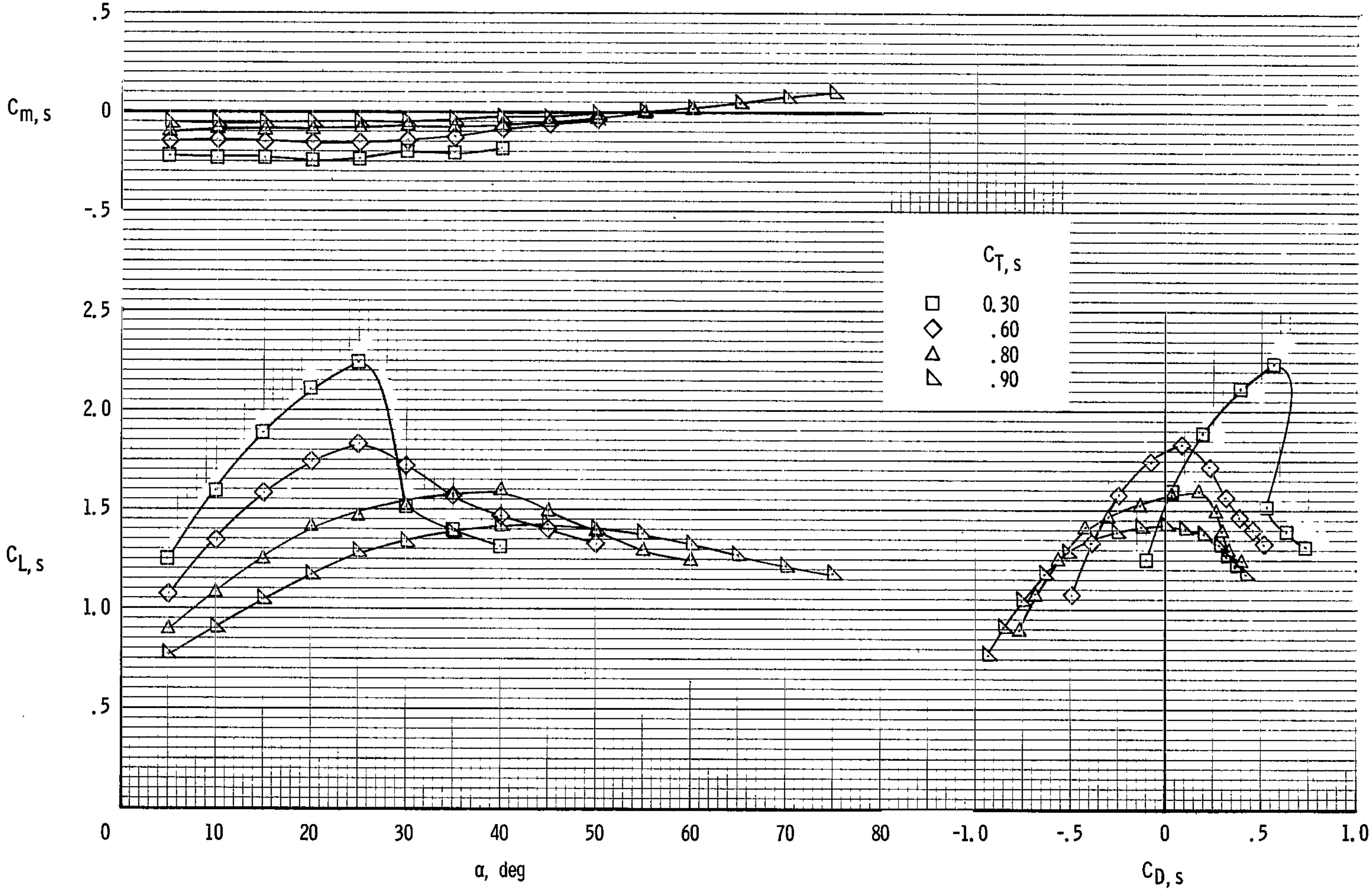
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 7.- Continued.



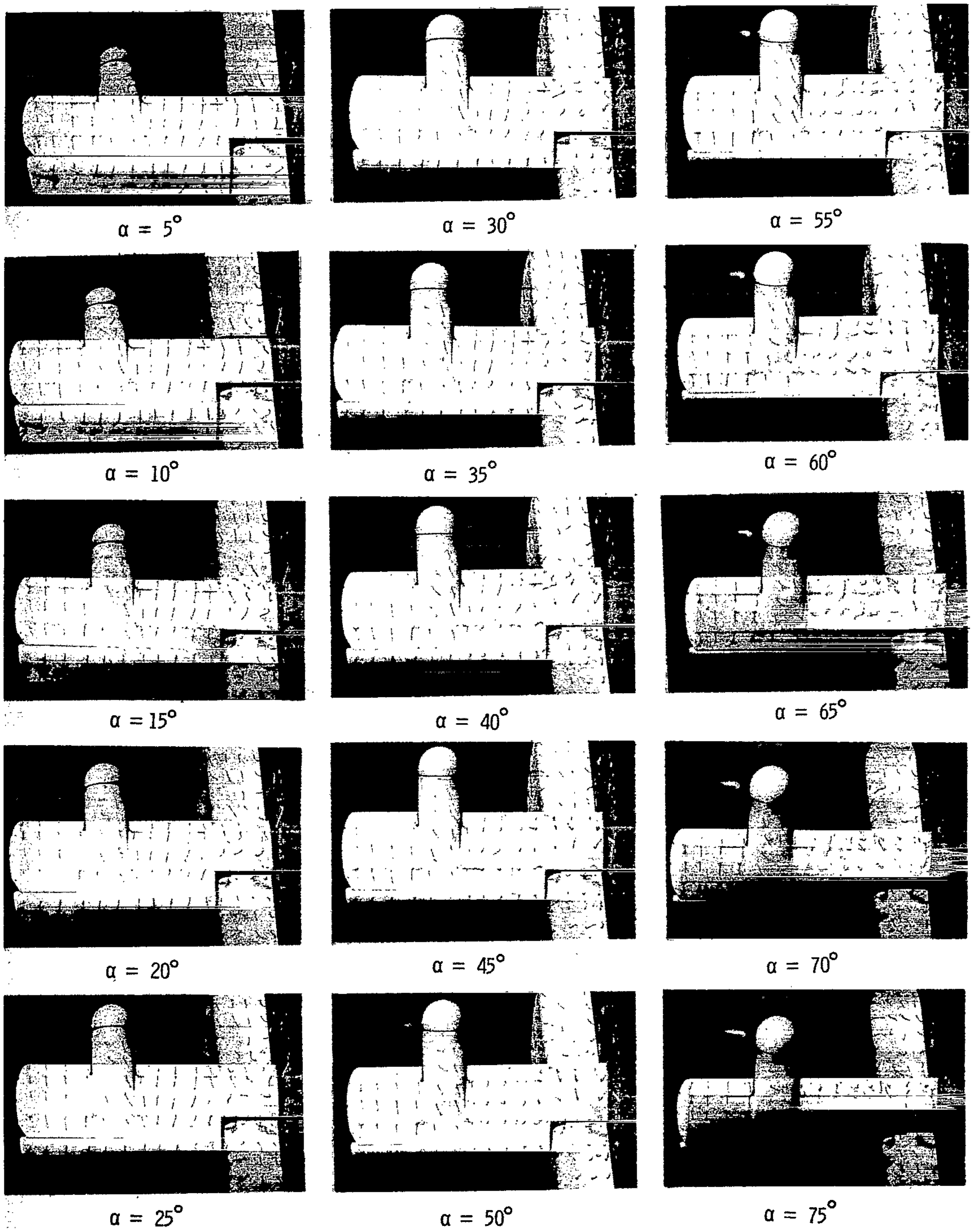
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 7.- Concluded.



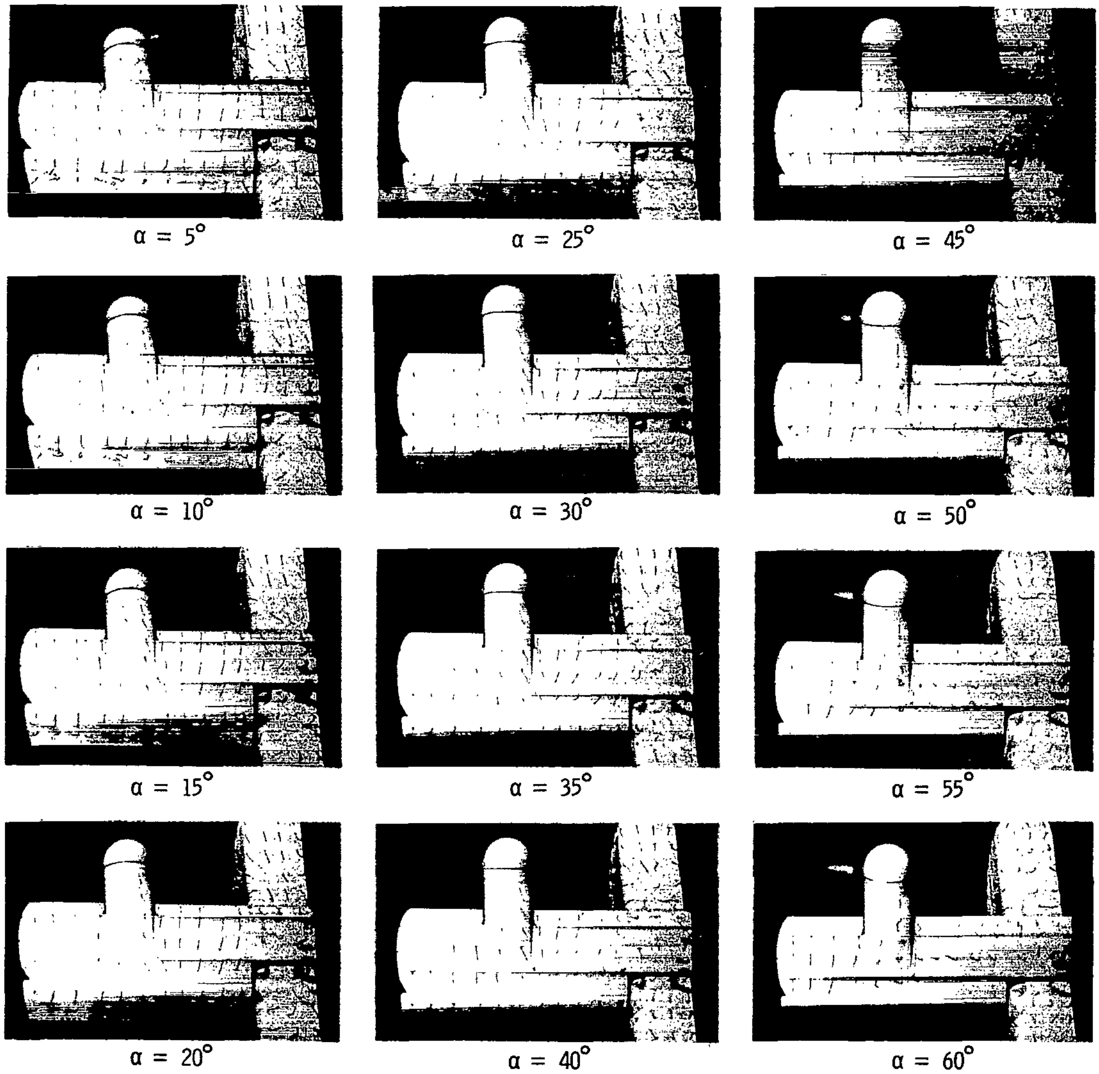
(a) Aerodynamic characteristics.

Figure 8.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Basic leading edge; $\delta_f = 40^o$.



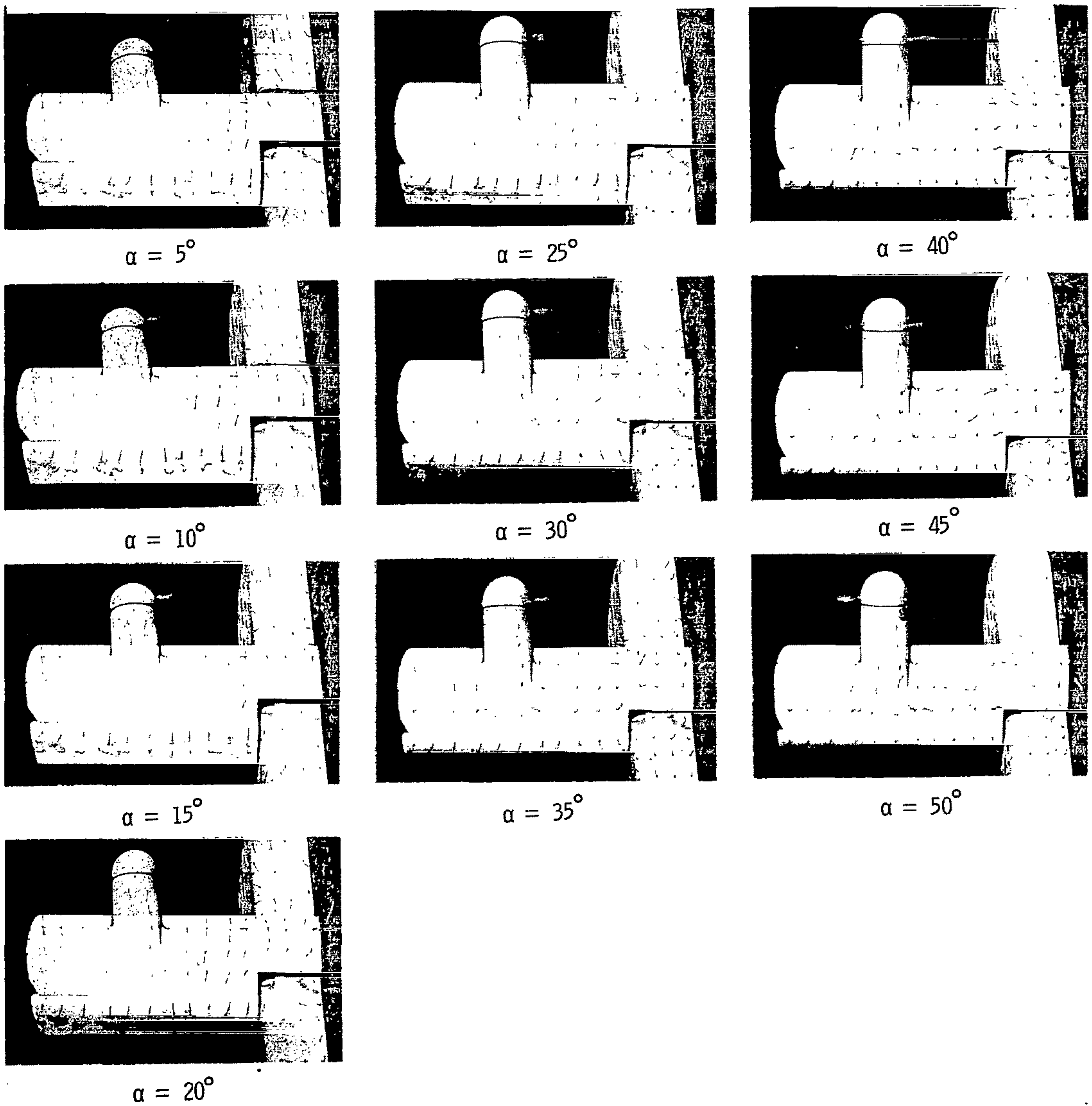
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 8.- Continued.



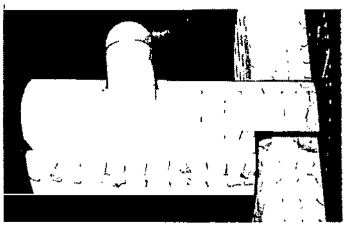
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 8.- Continued.

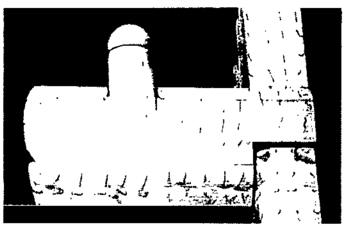


(d) Flow characteristics; $C_{T,s}$ = 0.60.

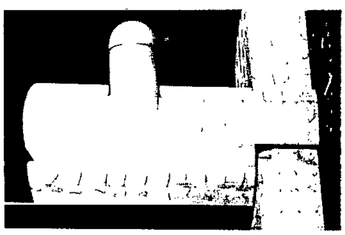
Figure 8.- Continued.



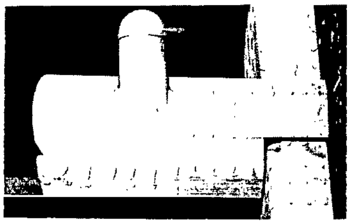
$\alpha = 10^\circ$



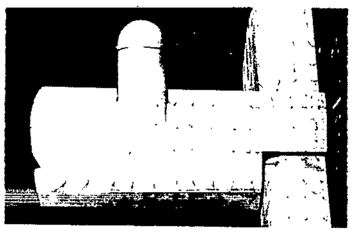
$\alpha = 15^\circ$



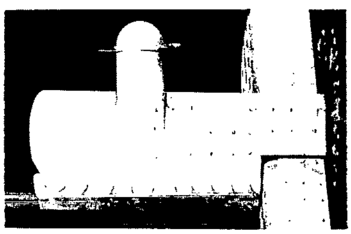
$\alpha = 20^\circ$



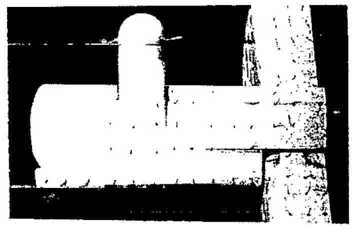
$\alpha = 25^\circ$



$\alpha = 30^\circ$



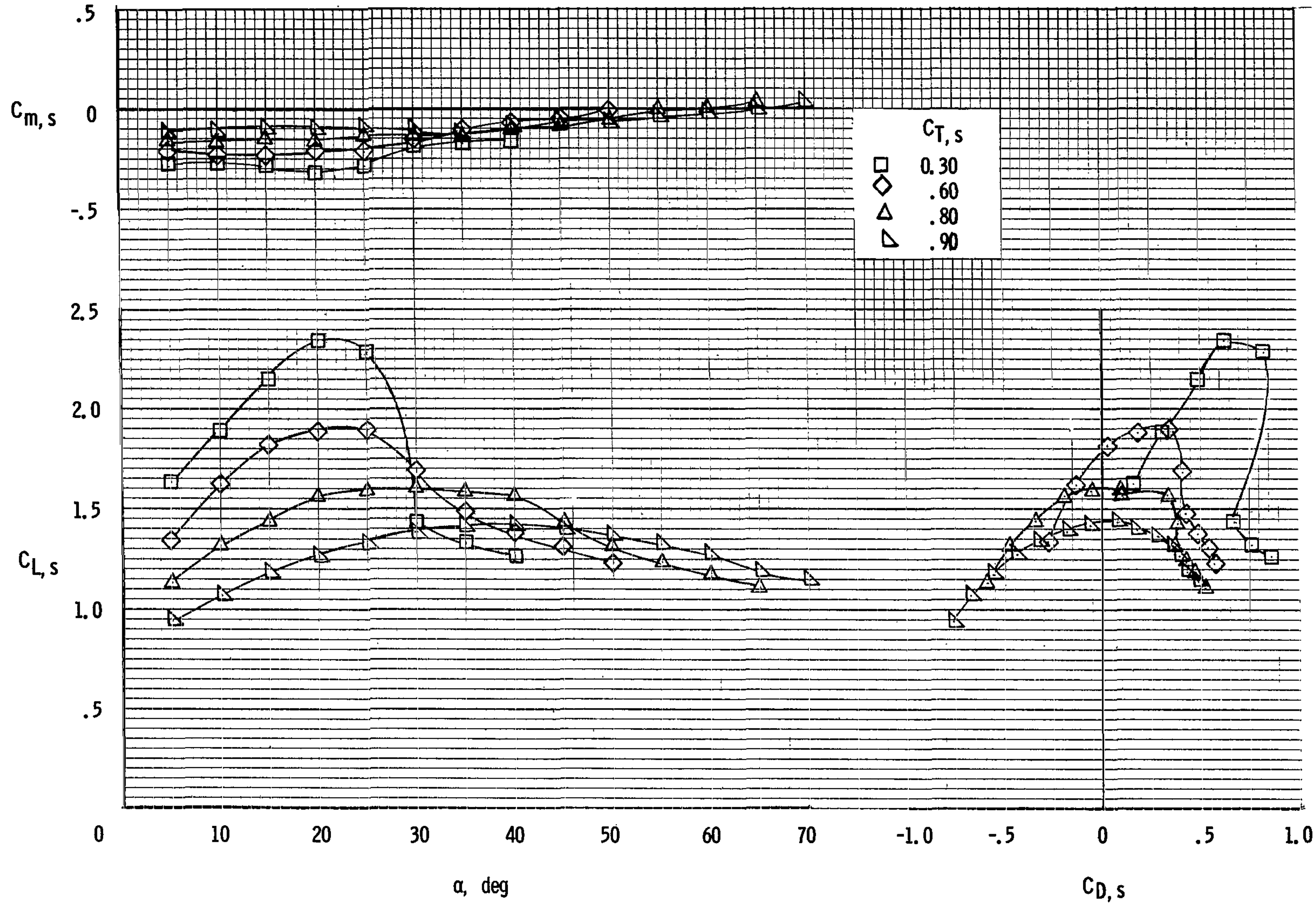
$\alpha = 35^\circ$



$\alpha = 40^\circ$

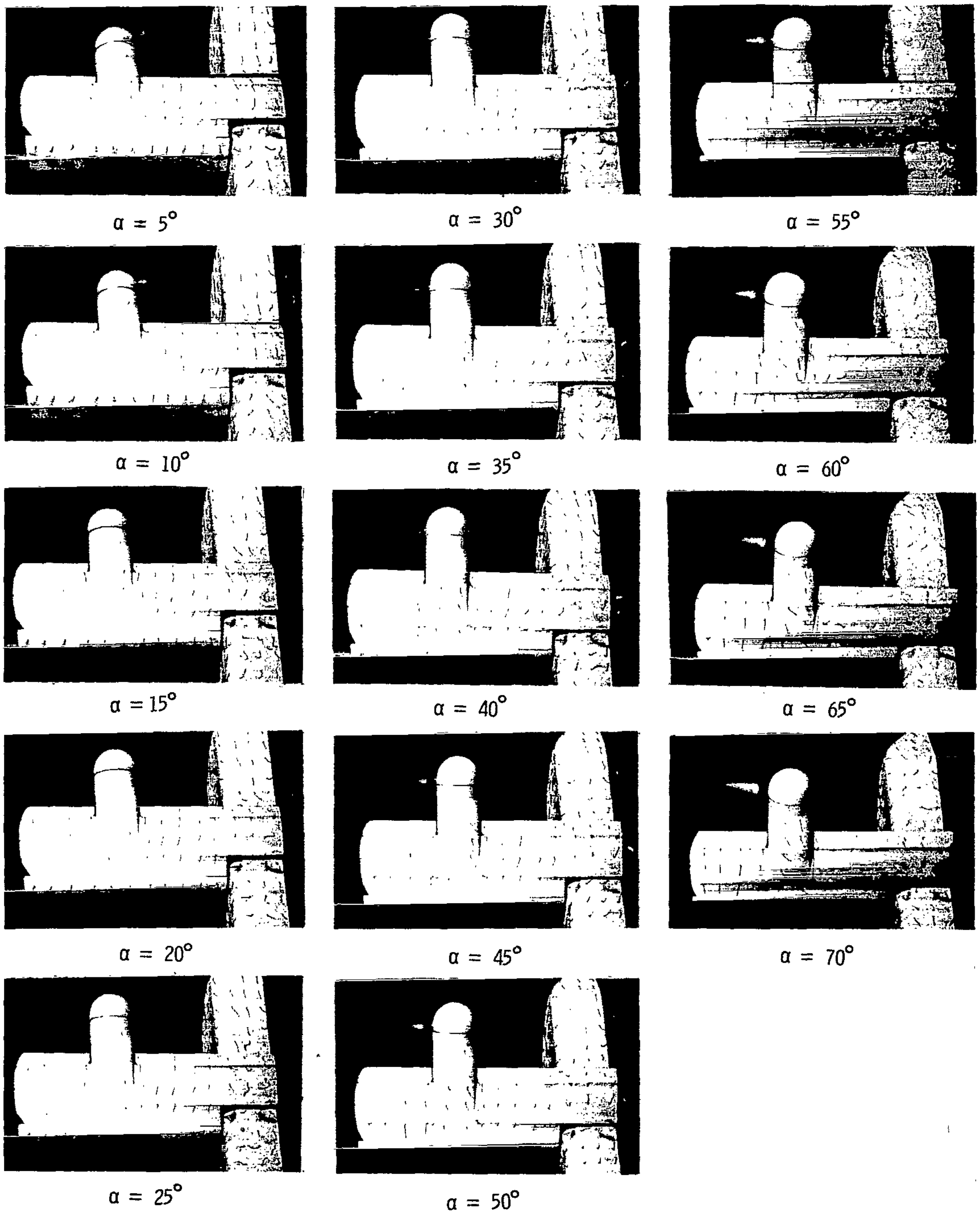
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 8.- Concluded.



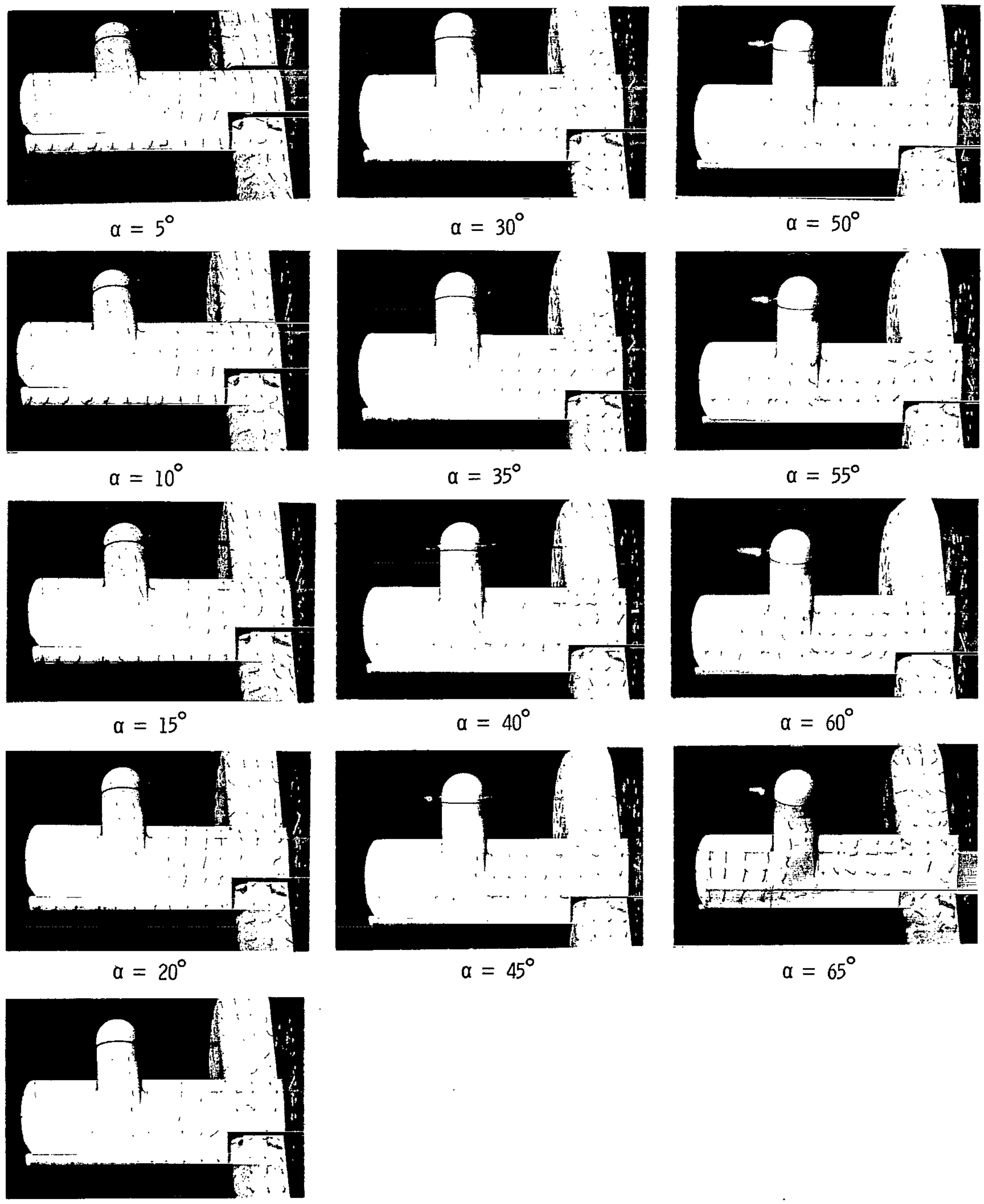
(a) Aerodynamic characteristics.

Figure 9.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Basic leading edge; $\delta_f = 60^{\circ}$.



(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 9.- Continued.



$\alpha = 5^\circ$ $\alpha = 30^\circ$ $\alpha = 50^\circ$

$\alpha = 10^\circ$ $\alpha = 35^\circ$ $\alpha = 55^\circ$

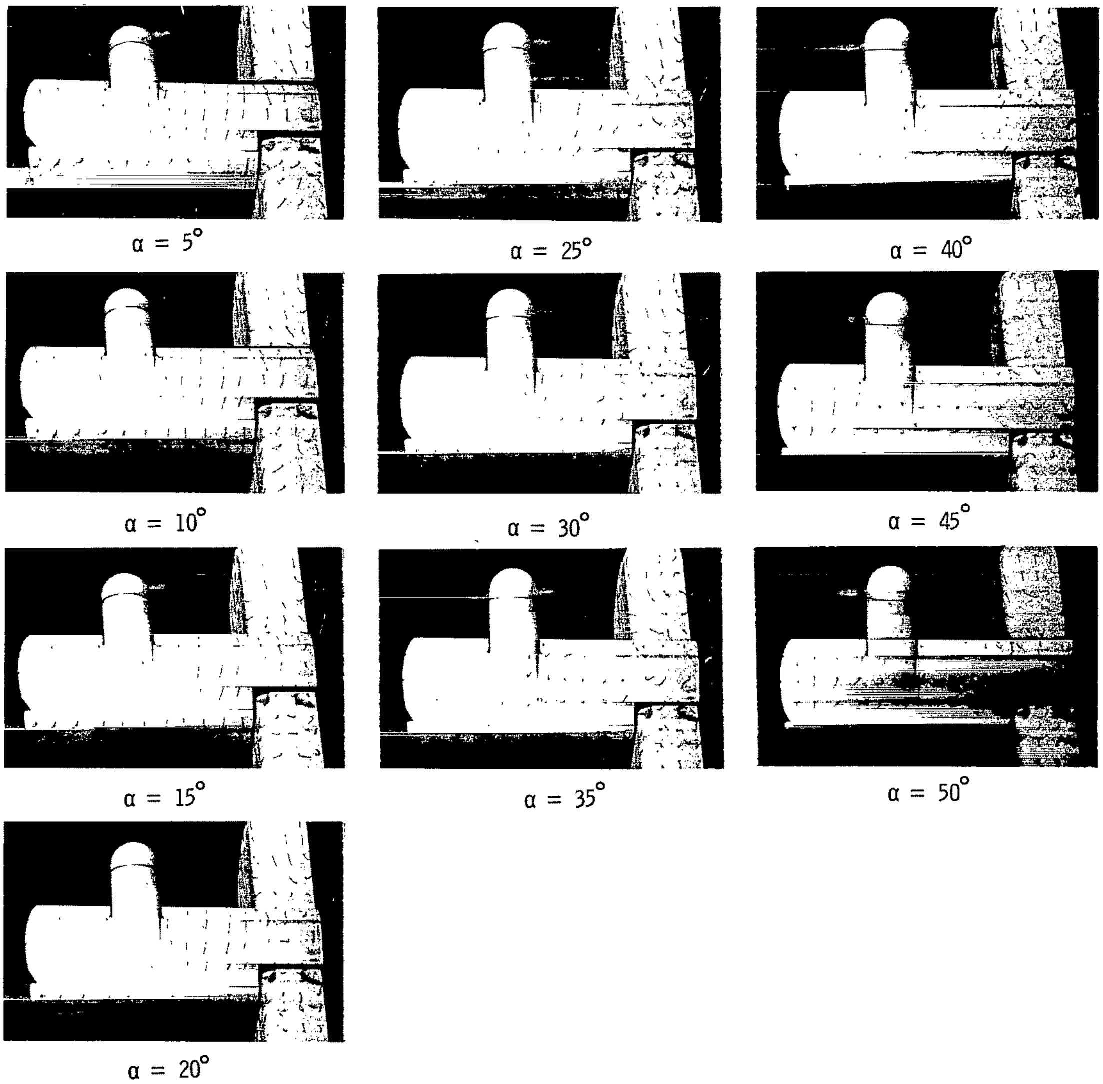
$\alpha = 15^\circ$ $\alpha = 40^\circ$ $\alpha = 60^\circ$

$\alpha = 20^\circ$ $\alpha = 45^\circ$ $\alpha = 65^\circ$

$\alpha = 25^\circ$

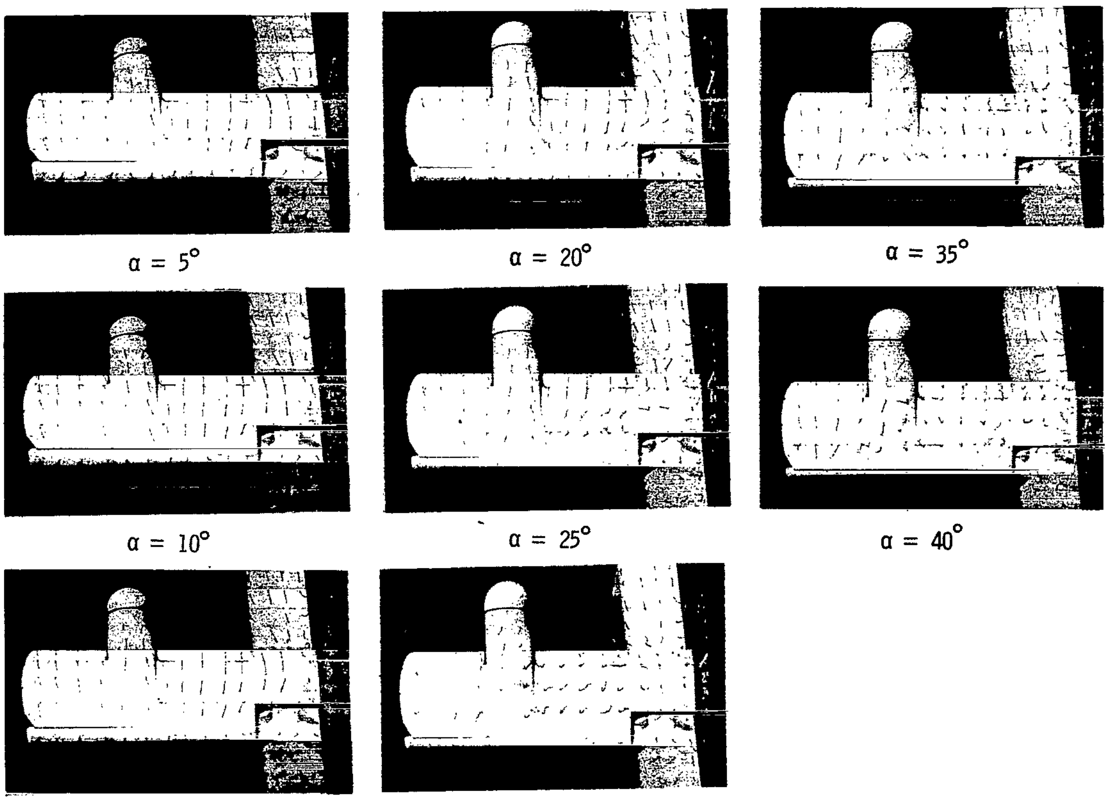
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 9.- Continued.



(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 9.- Continued.



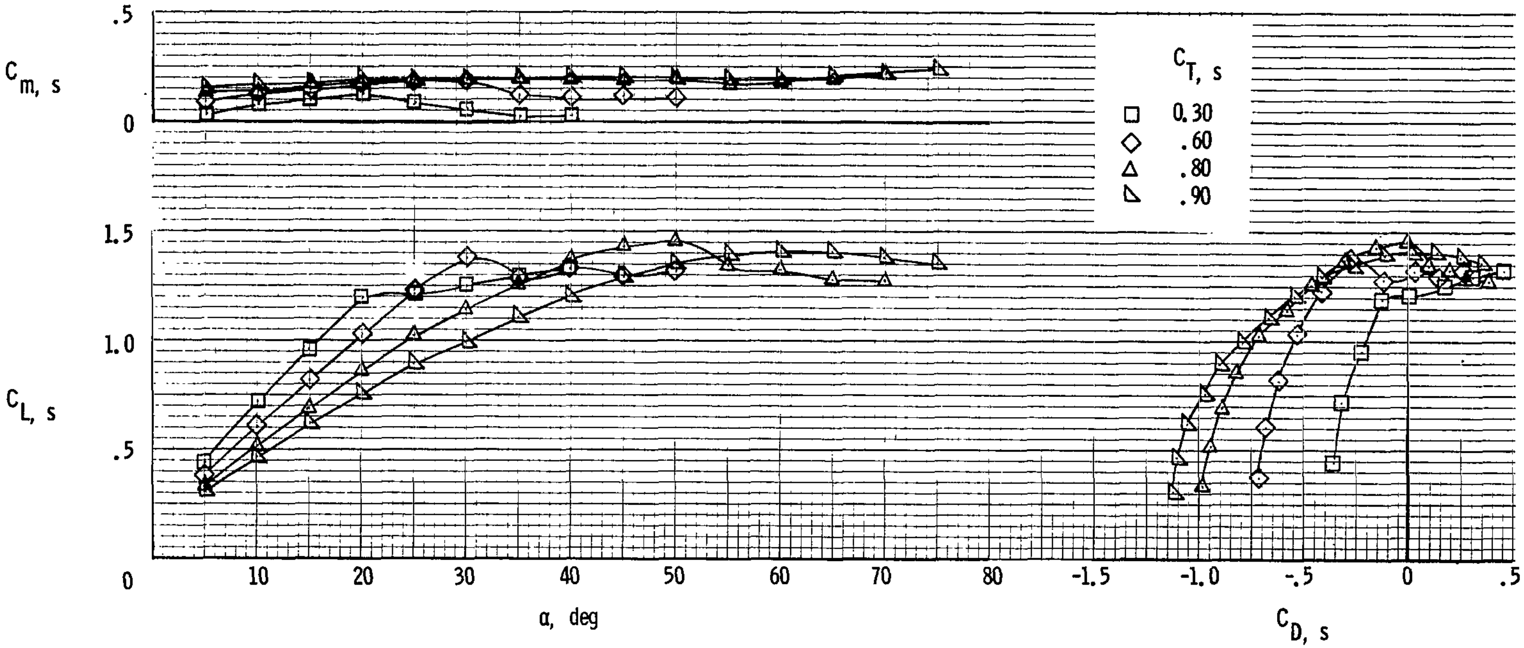
$\alpha = 5^\circ$ $\alpha = 20^\circ$ $\alpha = 35^\circ$

$\alpha = 10^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

$\alpha = 15^\circ$ $\alpha = 30^\circ$

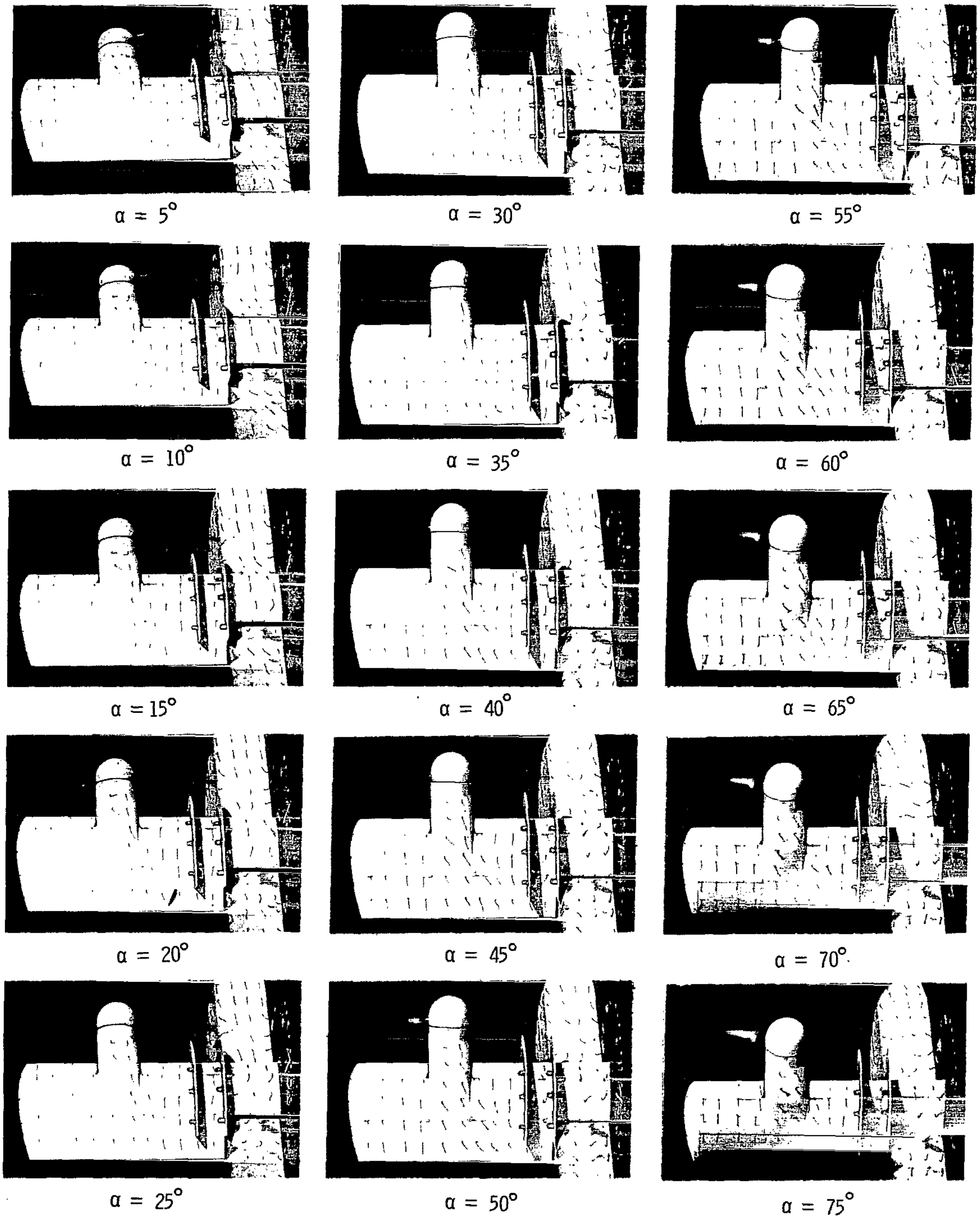
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 9.- Concluded.



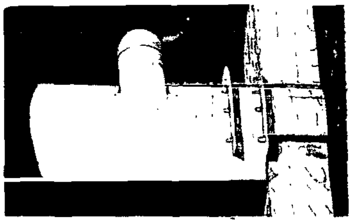
(a) Aerodynamic characteristics.

Figure 10.- Aerodynamic and flow characteristics of the wing with propeller rotation down at tip. Fences on; $\delta_f = 0^{\circ}$.

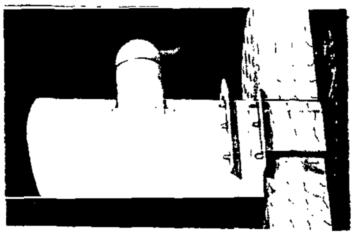


(b) Flow characteristics; $C_{T,s} = 0.90$.

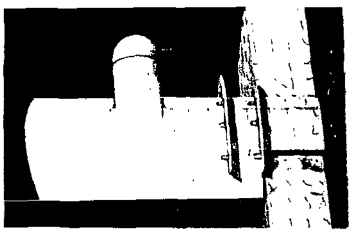
Figure 10.- Continued.



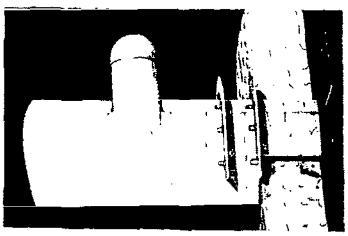
$\alpha = 5^\circ$



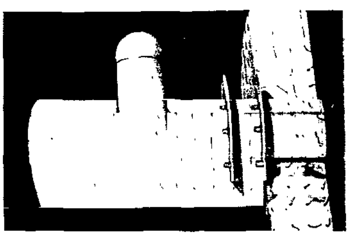
$\alpha = 10^\circ$



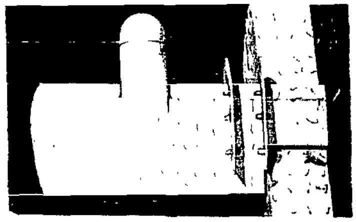
$\alpha = 15^\circ$



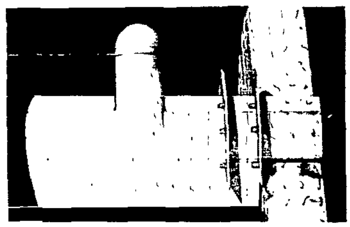
$\alpha = 20^\circ$



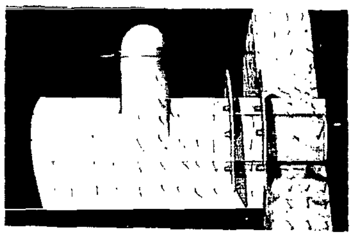
$\alpha = 25^\circ$



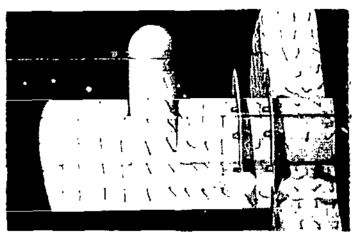
$\alpha = 30^\circ$



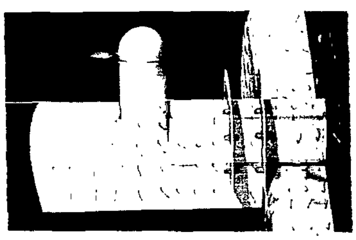
$\alpha = 35^\circ$



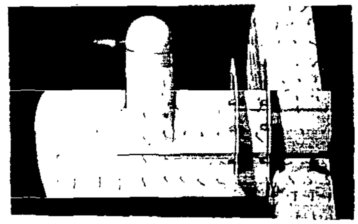
$\alpha = 40^\circ$



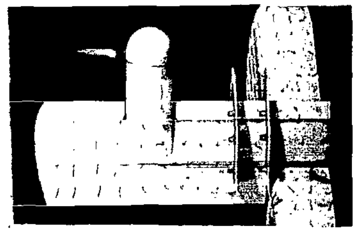
$\alpha = 45^\circ$



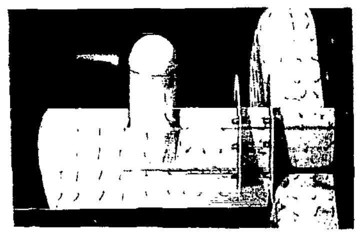
$\alpha = 50^\circ$



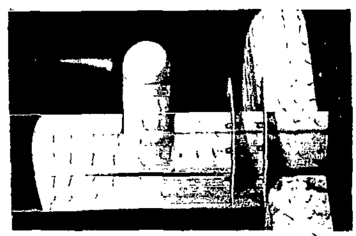
$\alpha = 55^\circ$



$\alpha = 60^\circ$



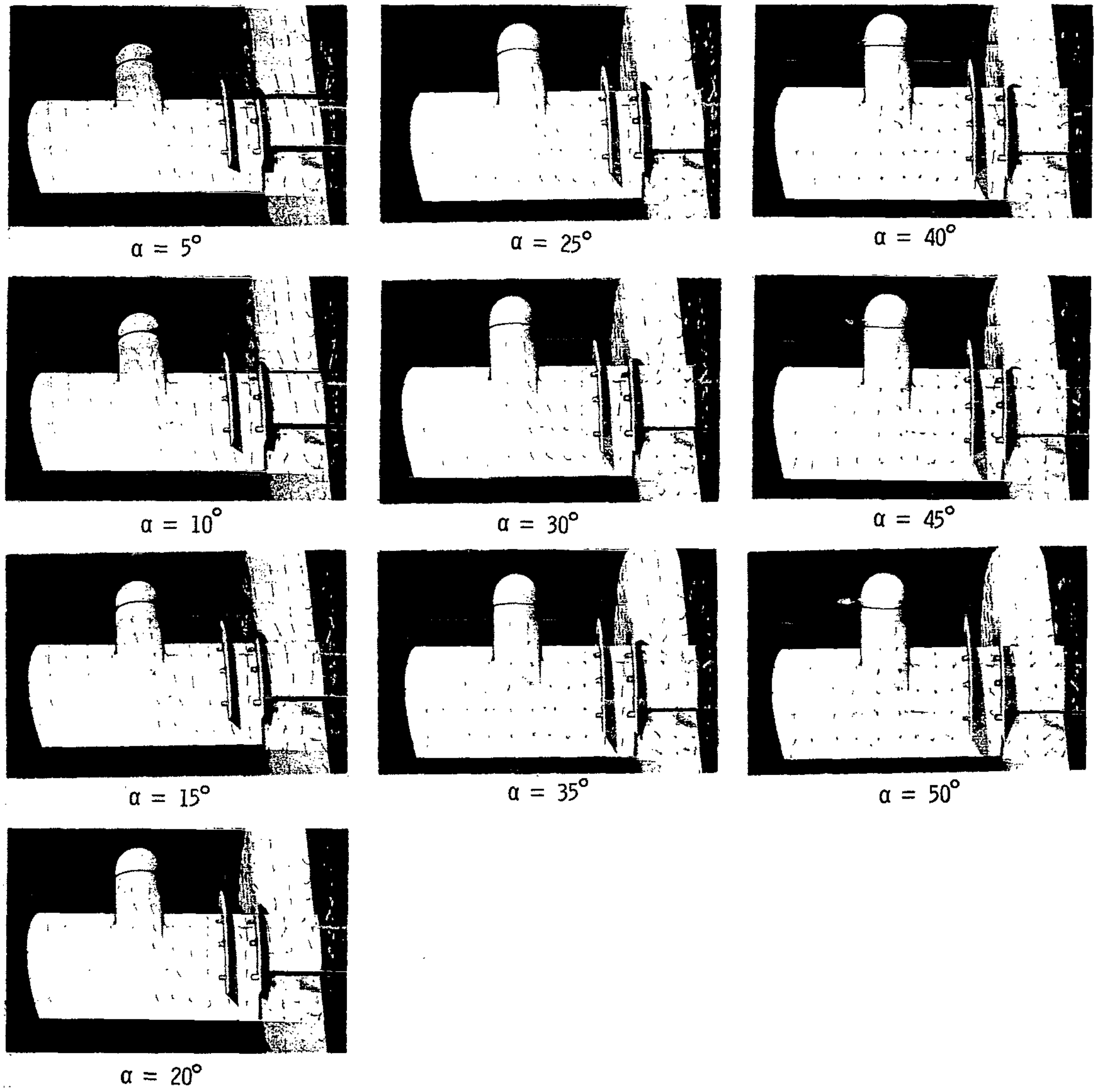
$\alpha = 65^\circ$



$\alpha = 70^\circ$

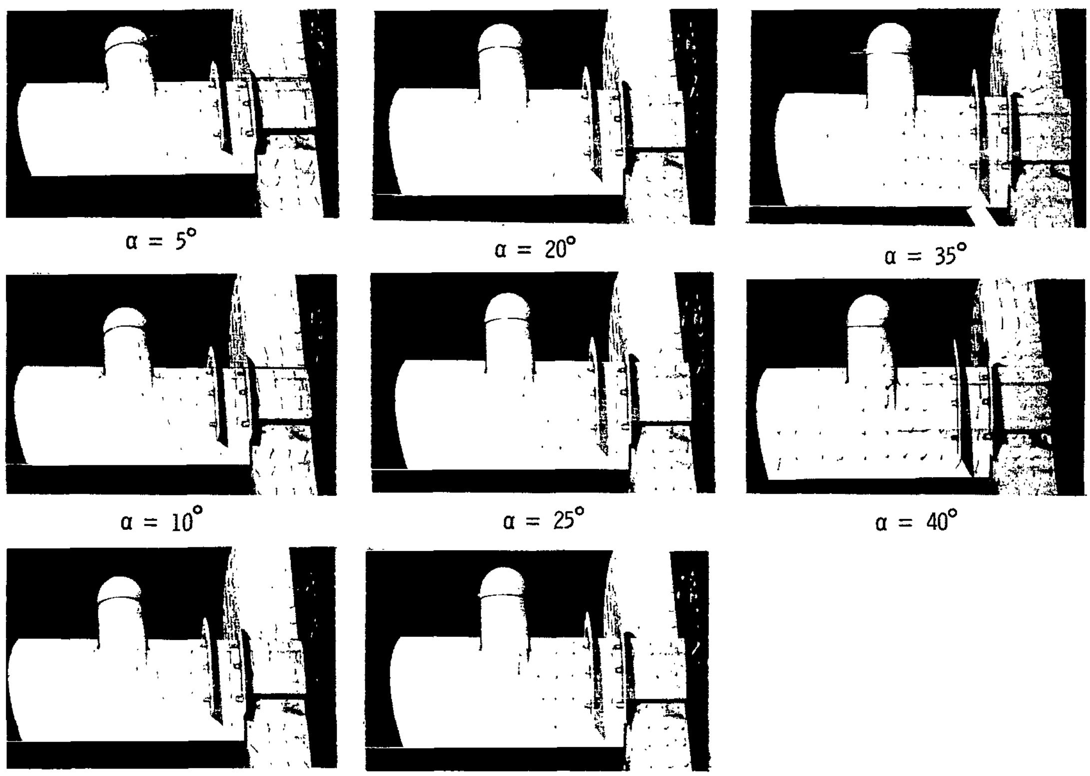
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 10.- Continued.



(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 10.- Continued.



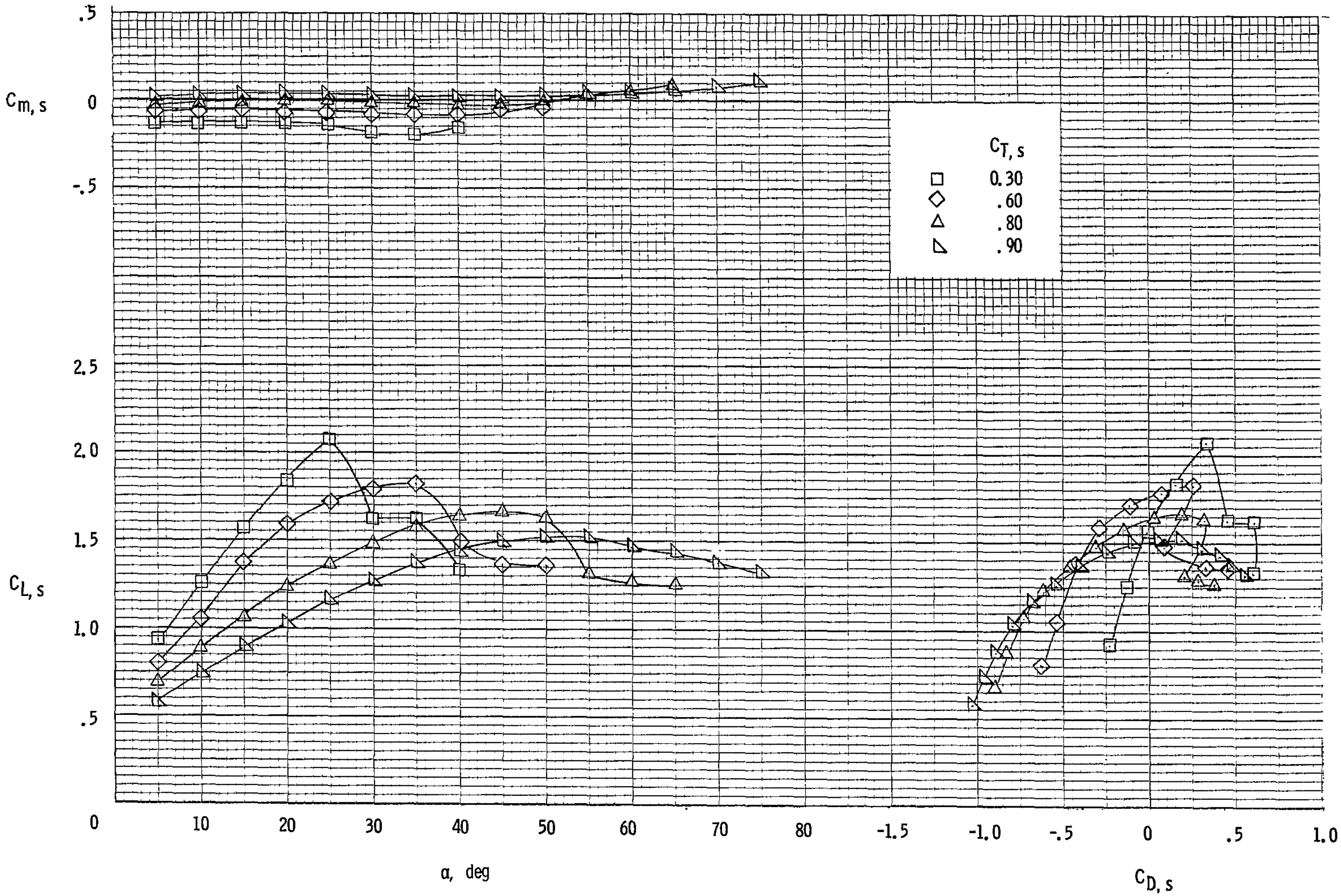
$\alpha = 5^\circ$ $\alpha = 20^\circ$ $\alpha = 35^\circ$

$\alpha = 10^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

$\alpha = 15^\circ$ $\alpha = 30^\circ$

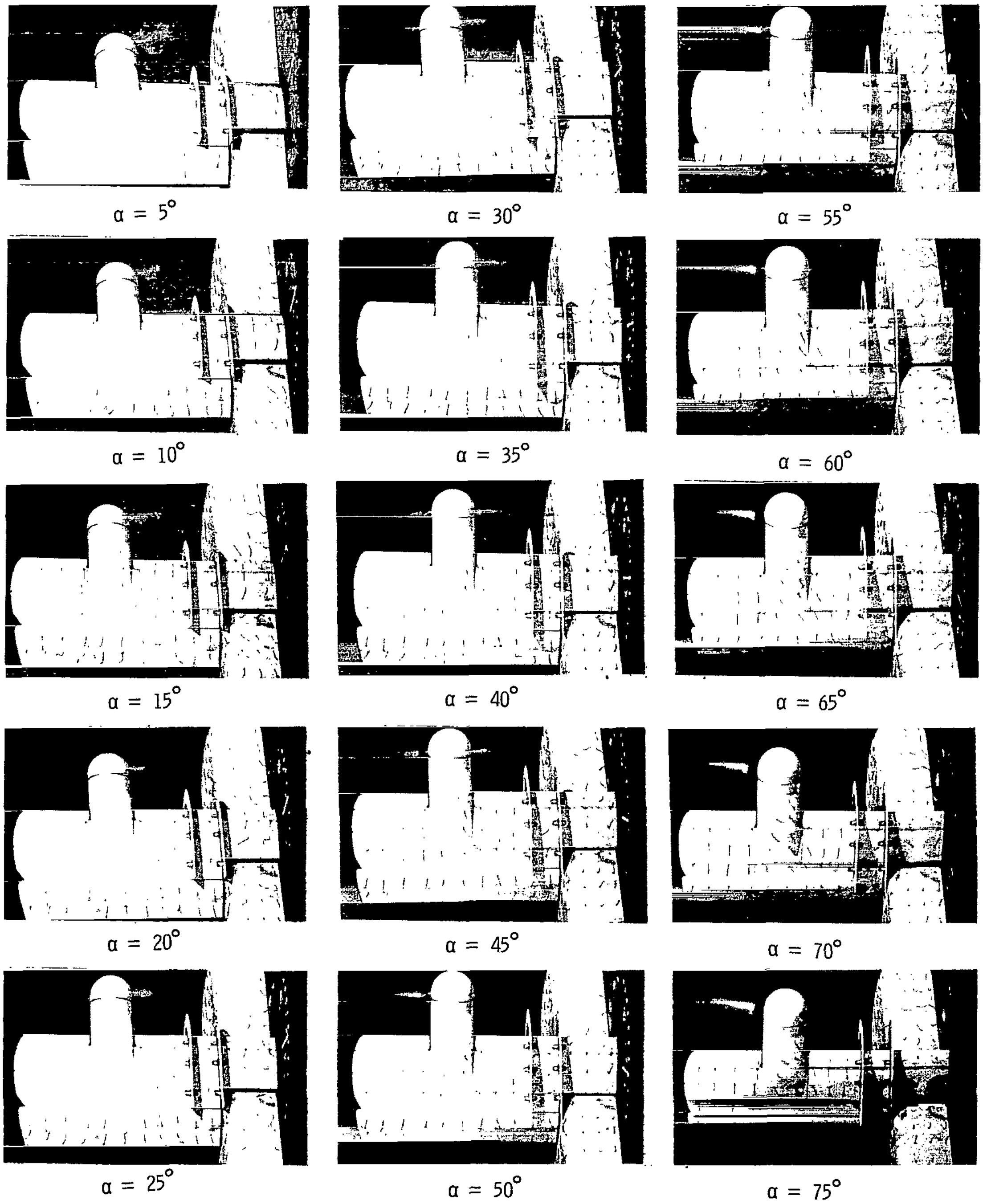
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 10.- Concluded.



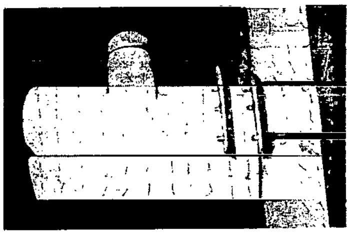
(a) Aerodynamic characteristics.

Figure 11.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Fences on; $\delta_f = 20^0$.

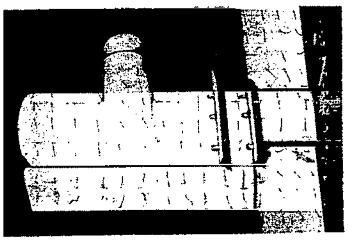


(b) Flow characteristics; $C_{T,s} = 0.90$.

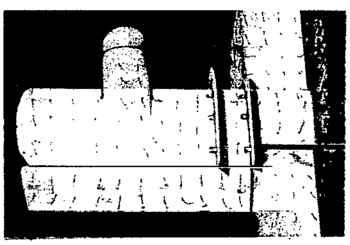
Figure 11.- Continued.



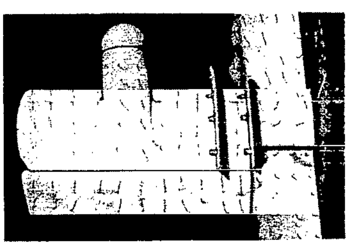
$\alpha = 5^\circ$



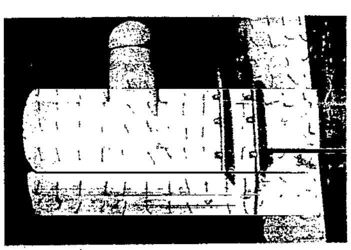
$\alpha = 10^\circ$



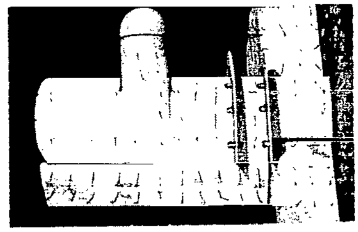
$\alpha = 15^\circ$



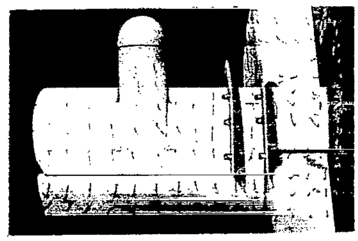
$\alpha = 20^\circ$



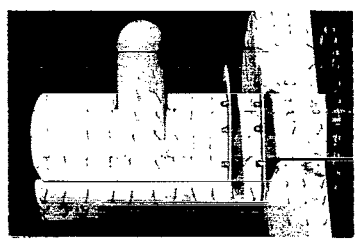
$\alpha = 25^\circ$



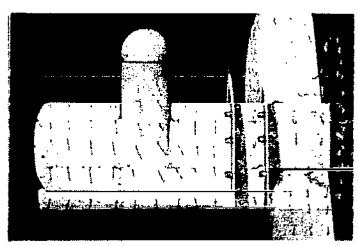
$\alpha = 30^\circ$



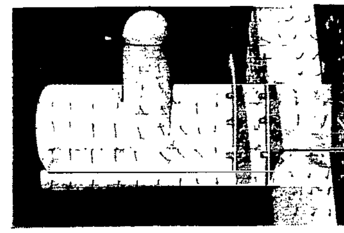
$\alpha = 35^\circ$



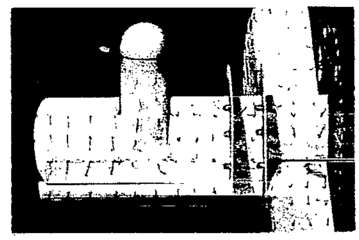
$\alpha = 40^\circ$



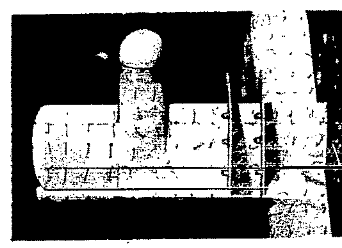
$\alpha = 45^\circ$



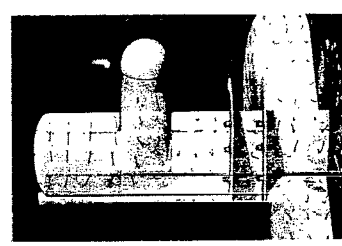
$\alpha = 50^\circ$



$\alpha = 55^\circ$



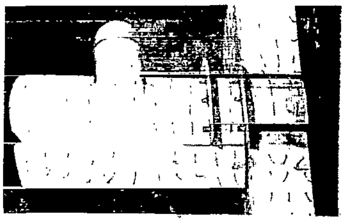
$\alpha = 60^\circ$



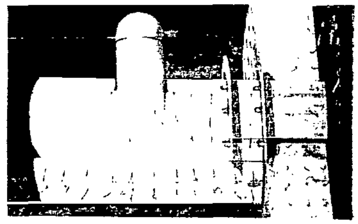
$\alpha = 65^\circ$

(c) Flow characteristics; $C_{T,s} = 0.80$.

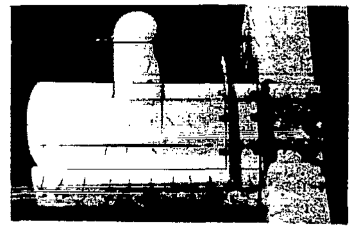
Figure 11.- Continued.



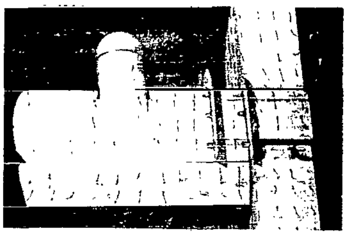
α = 5°



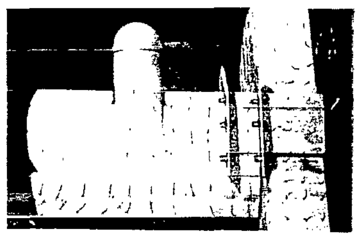
α = 25°



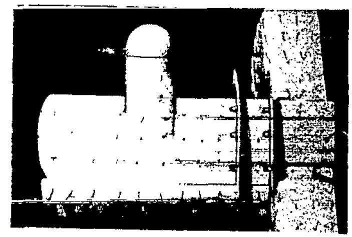
α = 40°



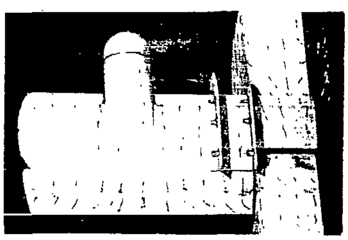
α = 10°



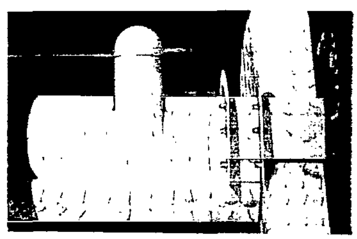
α = 30°



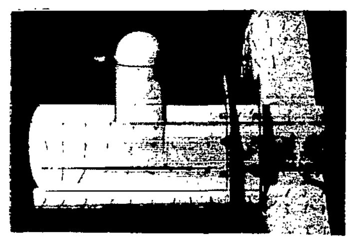
α = 45°



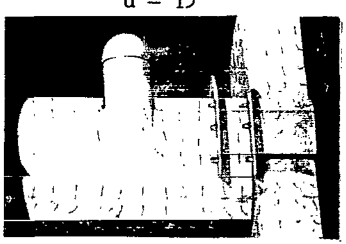
α = 15°



α = 35°



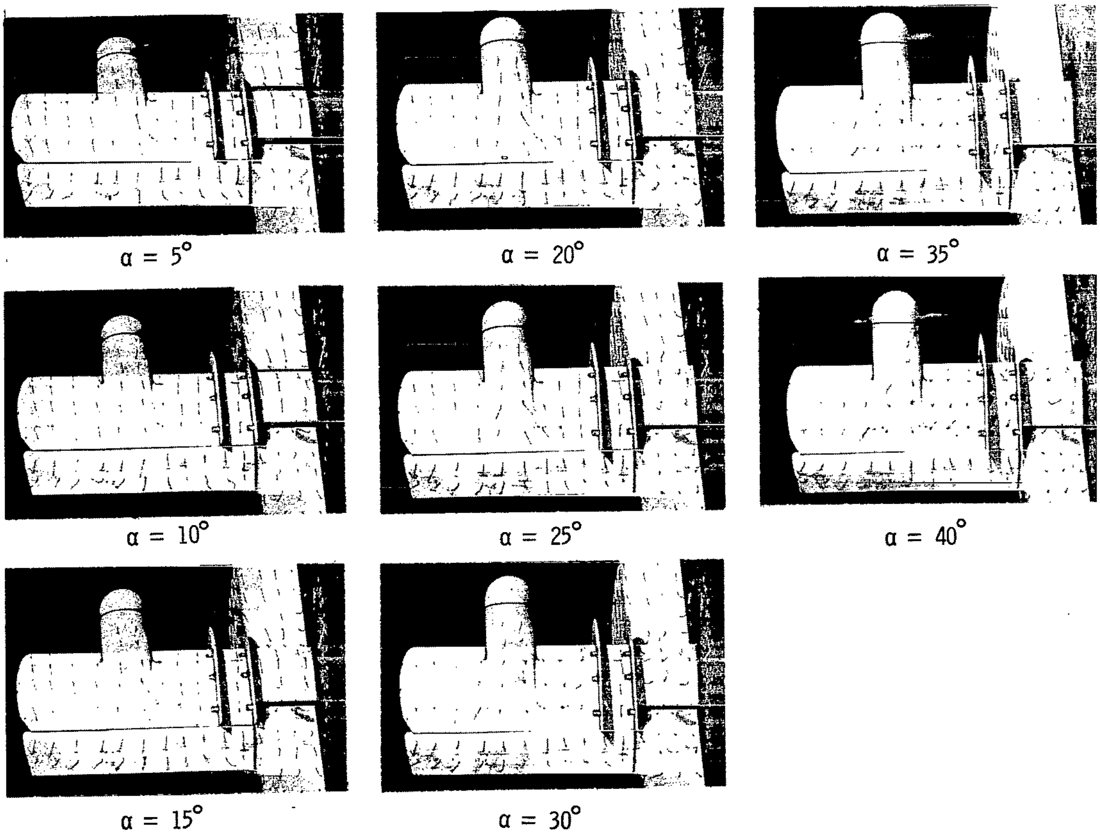
α = 50°



α = 20°

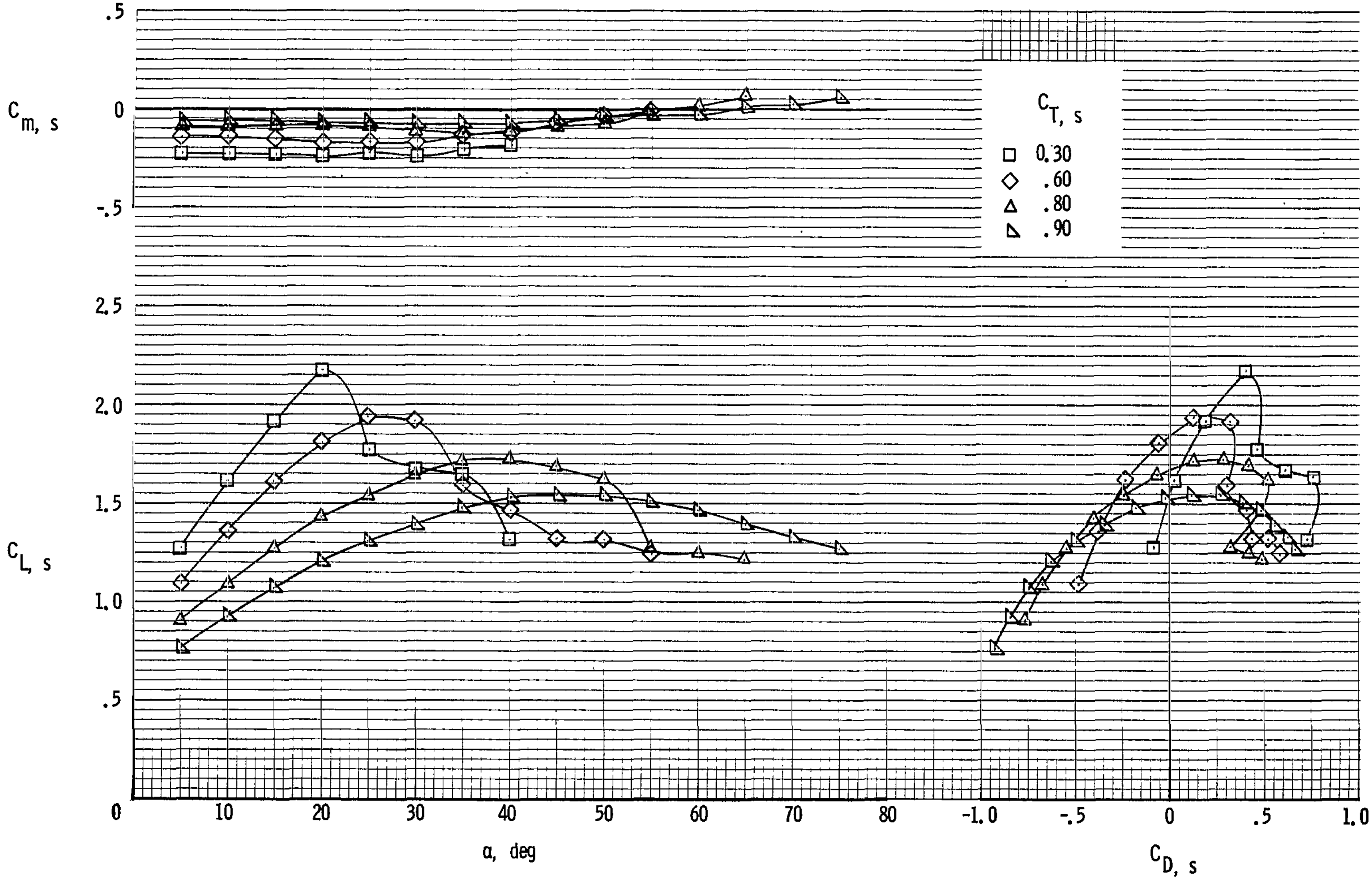
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 11.- Continued.



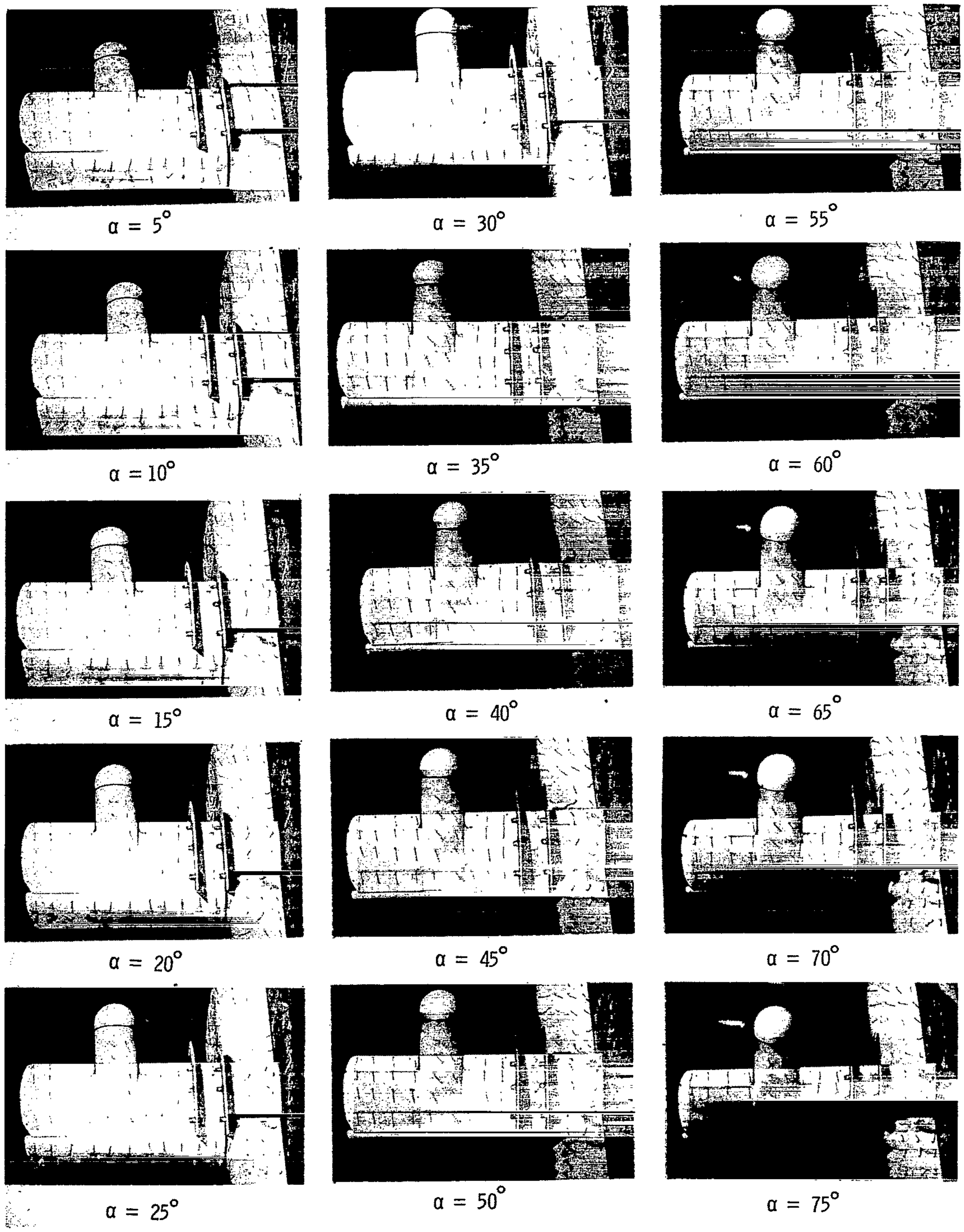
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 11.- Concluded.



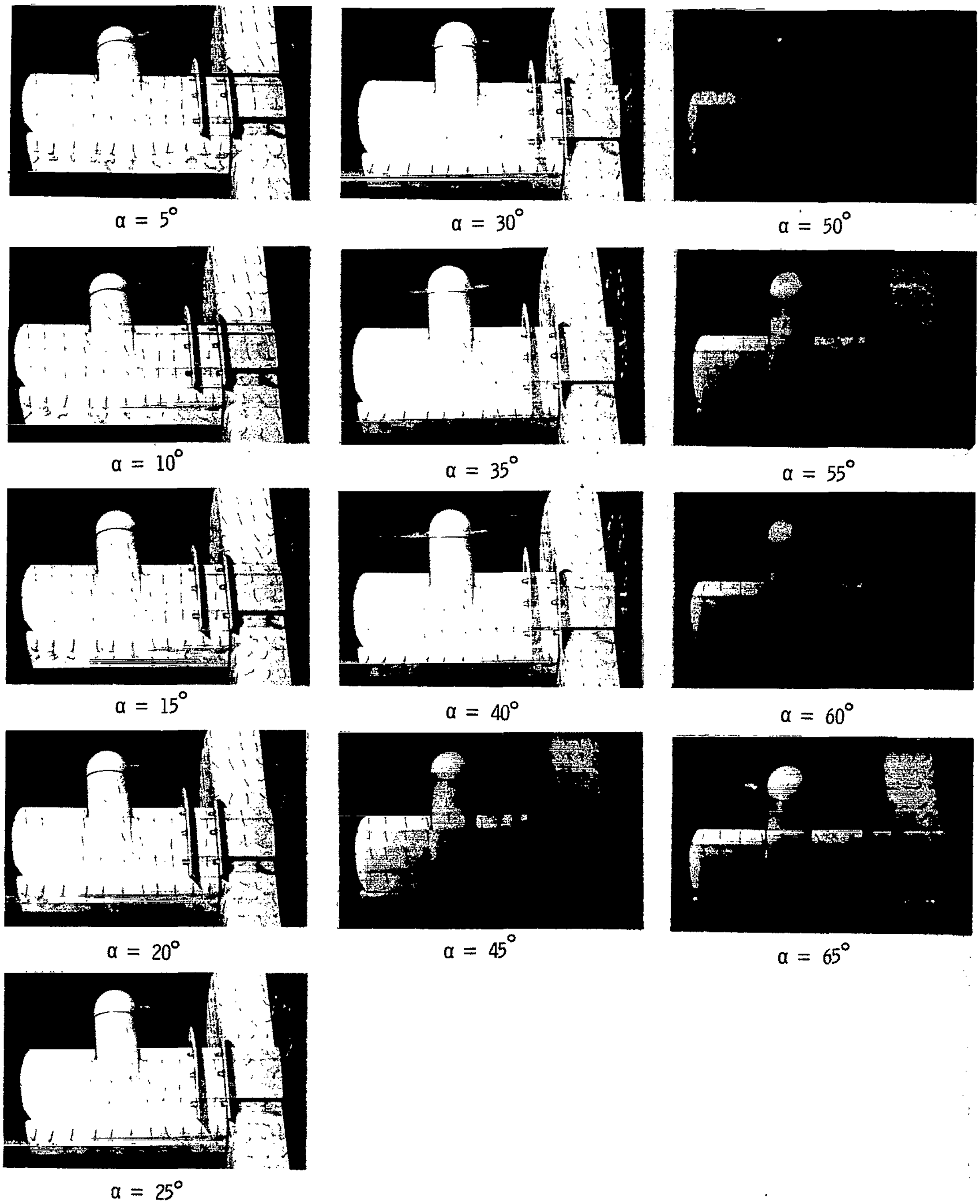
(a) Aerodynamic characteristics.

Figure 12.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Fences on; $\delta_f = 40^o$.



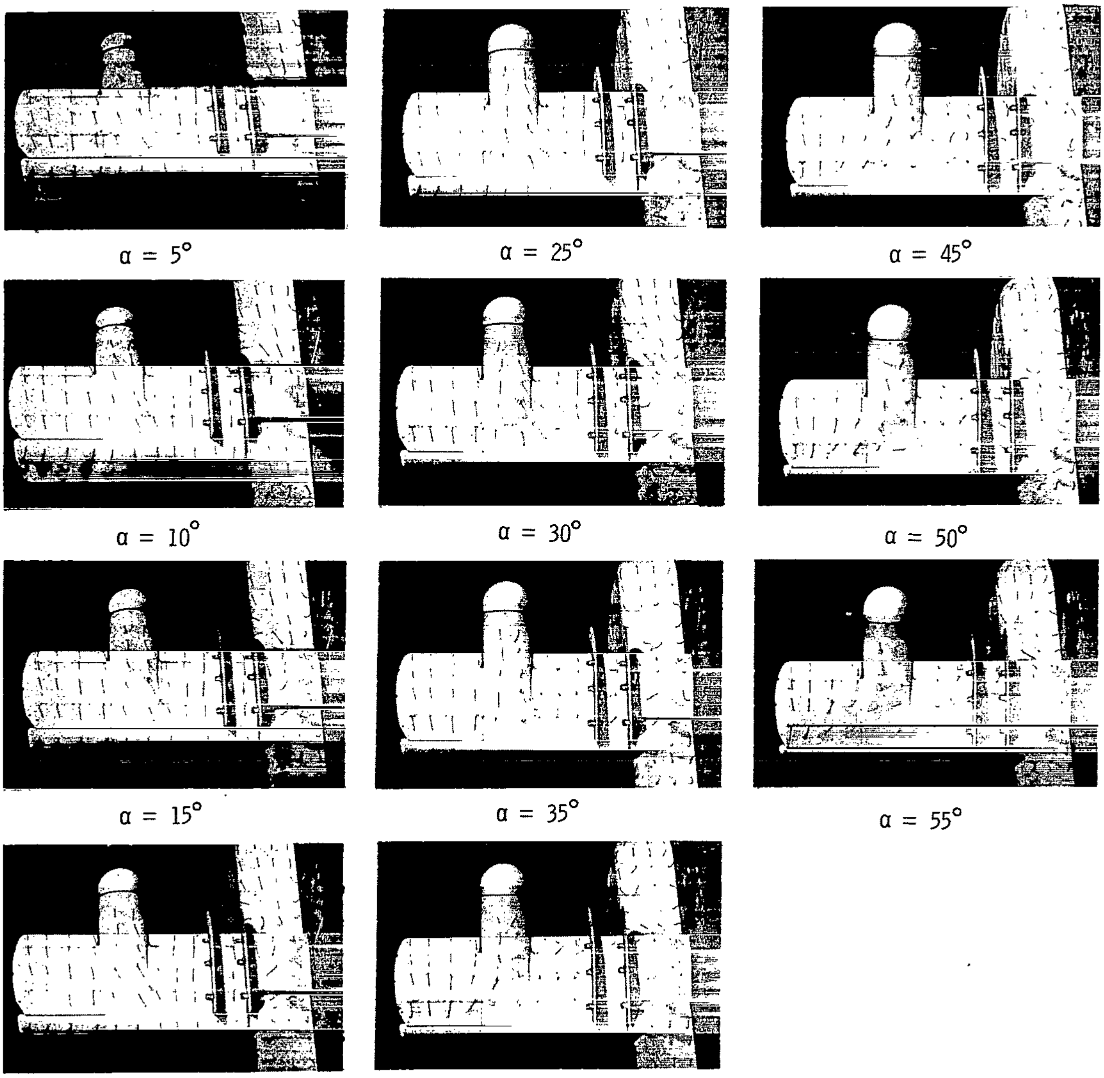
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 12.- Continued.



(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 12.- Continued.



$\alpha = 5^\circ$

$\alpha = 10^\circ$

$\alpha = 15^\circ$

$\alpha = 20^\circ$

$\alpha = 25^\circ$

$\alpha = 30^\circ$

$\alpha = 35^\circ$

$\alpha = 40^\circ$

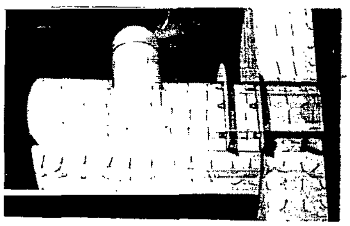
$\alpha = 45^\circ$

$\alpha = 50^\circ$

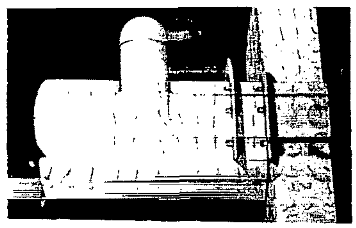
$\alpha = 55^\circ$

(d) Flow characteristics; $C_{T,s} = 0.60$.

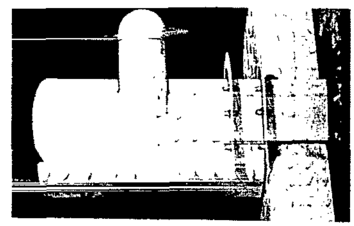
Figure 12.- Continued.



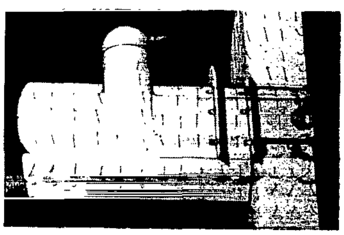
$\alpha = 5^\circ$



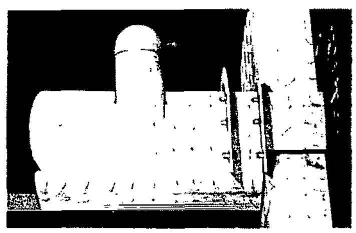
$\alpha = 20^\circ$



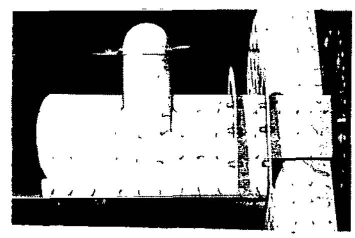
$\alpha = 35^\circ$



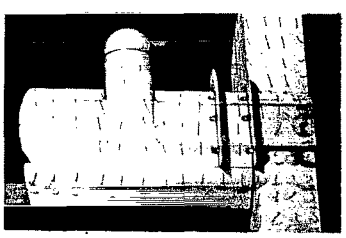
$\alpha = 10^\circ$



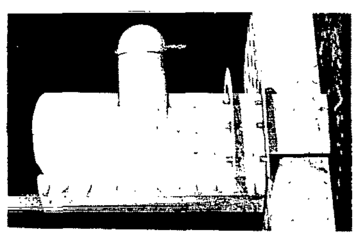
$\alpha = 25^\circ$



$\alpha = 40^\circ$



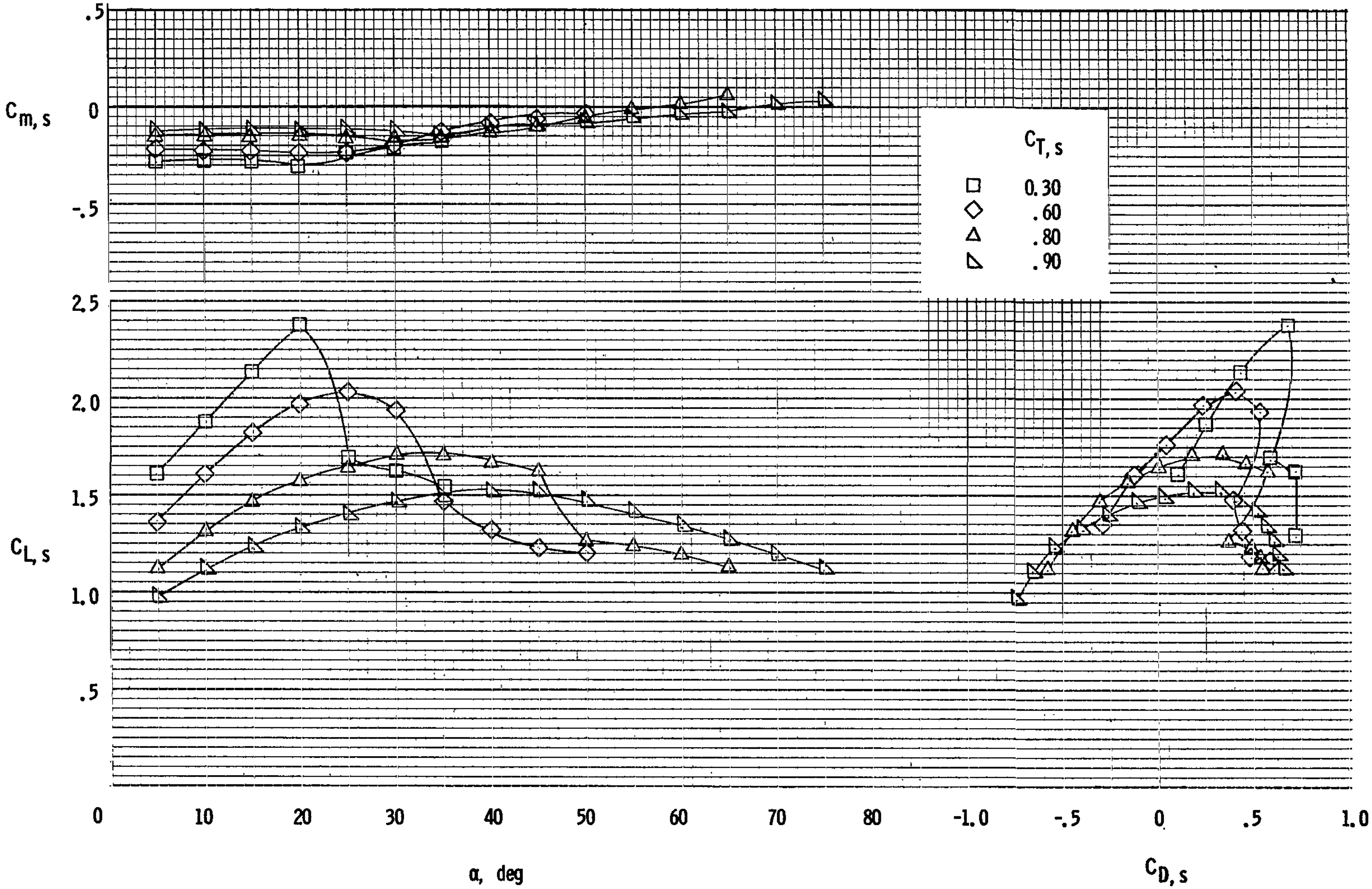
$\alpha = 15^\circ$



$\alpha = 30^\circ$

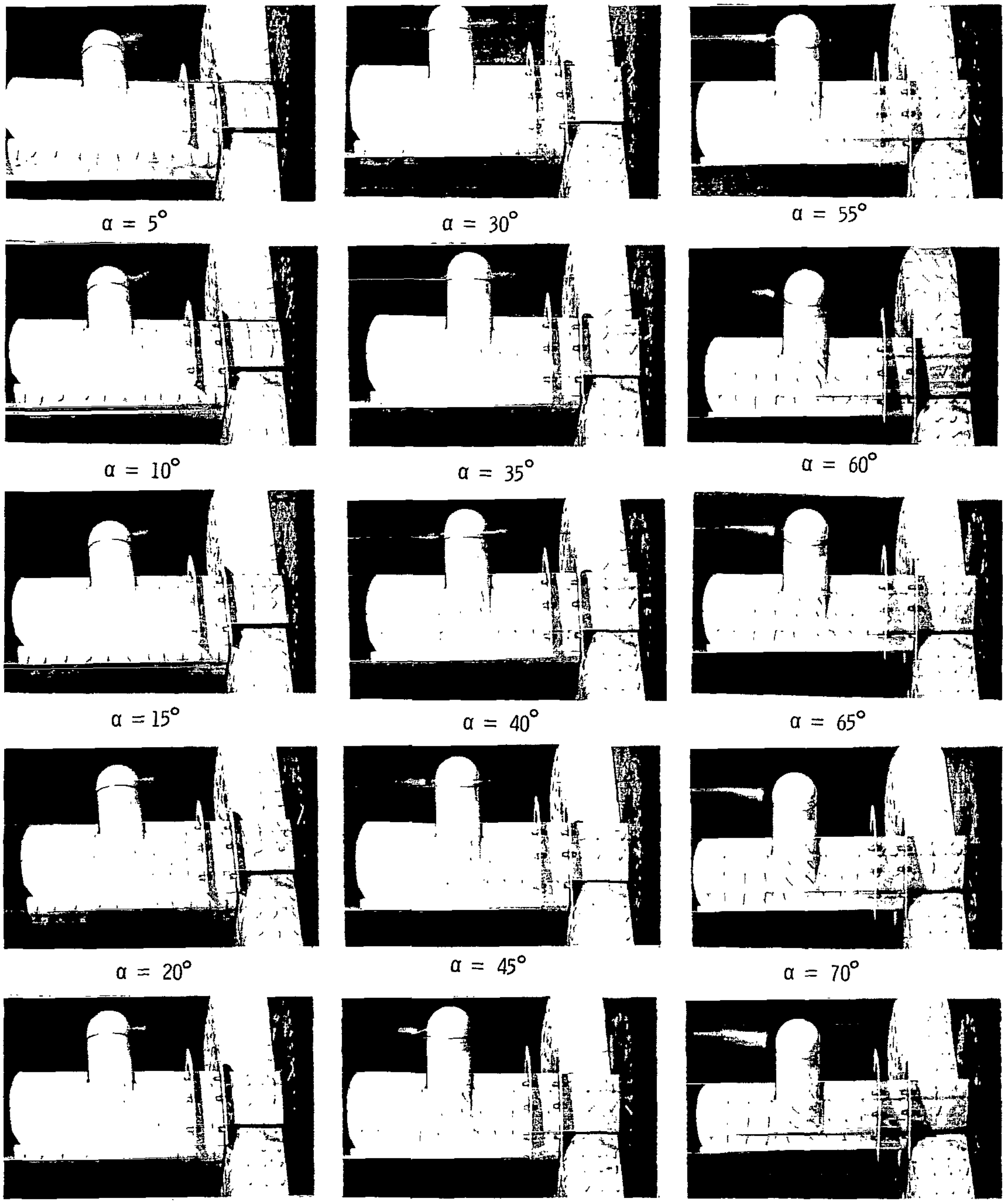
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 12.- Concluded.



(a) Aerodynamic characteristics.

Figure 13.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Fences on; $\delta_f = 60^{\circ}$.



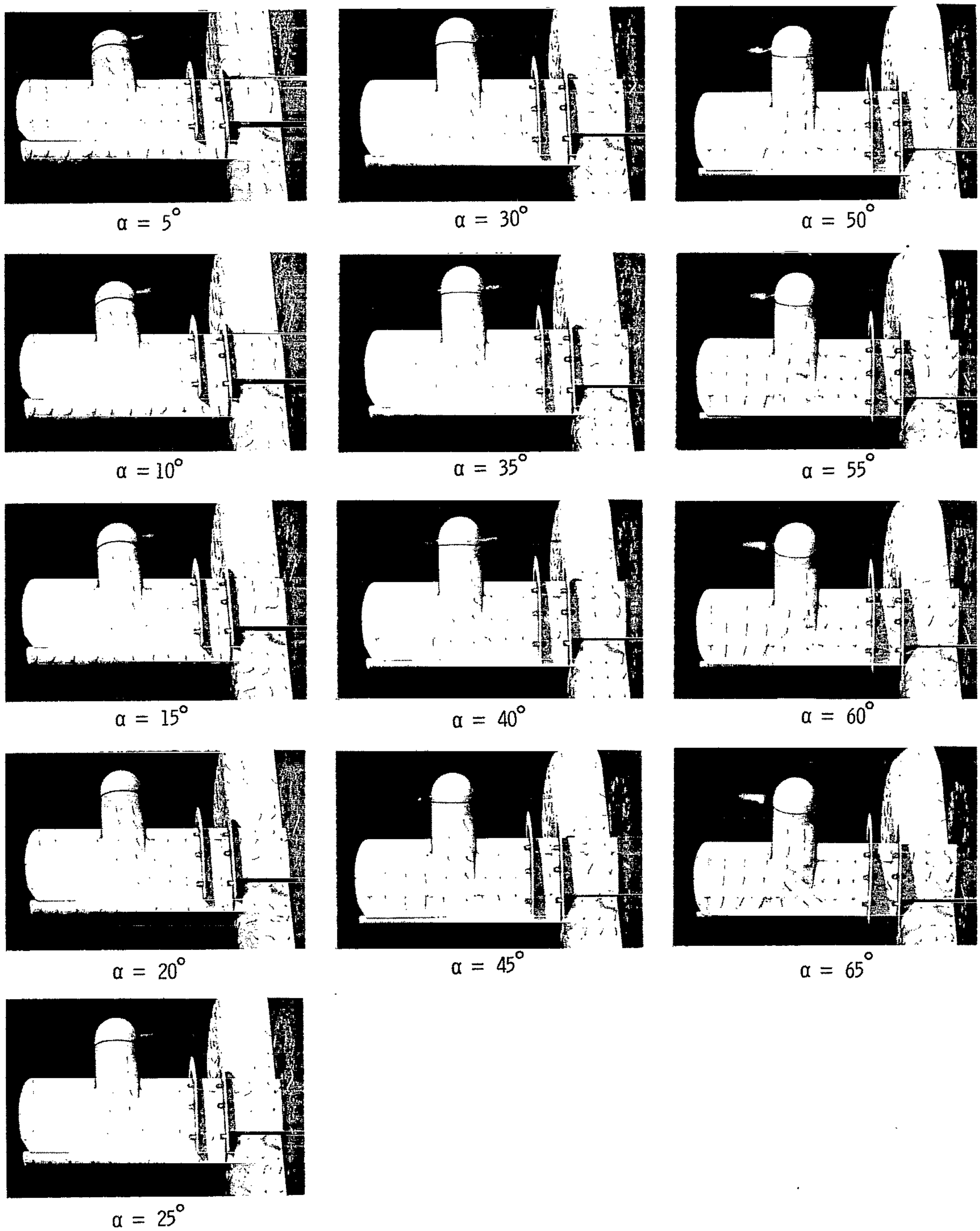
$\alpha = 5^\circ$ $\alpha = 10^\circ$ $\alpha = 15^\circ$ $\alpha = 20^\circ$ $\alpha = 25^\circ$

$\alpha = 30^\circ$ $\alpha = 35^\circ$ $\alpha = 40^\circ$ $\alpha = 45^\circ$ $\alpha = 50^\circ$

$\alpha = 55^\circ$ $\alpha = 60^\circ$ $\alpha = 65^\circ$ $\alpha = 70^\circ$ $\alpha = 75^\circ$

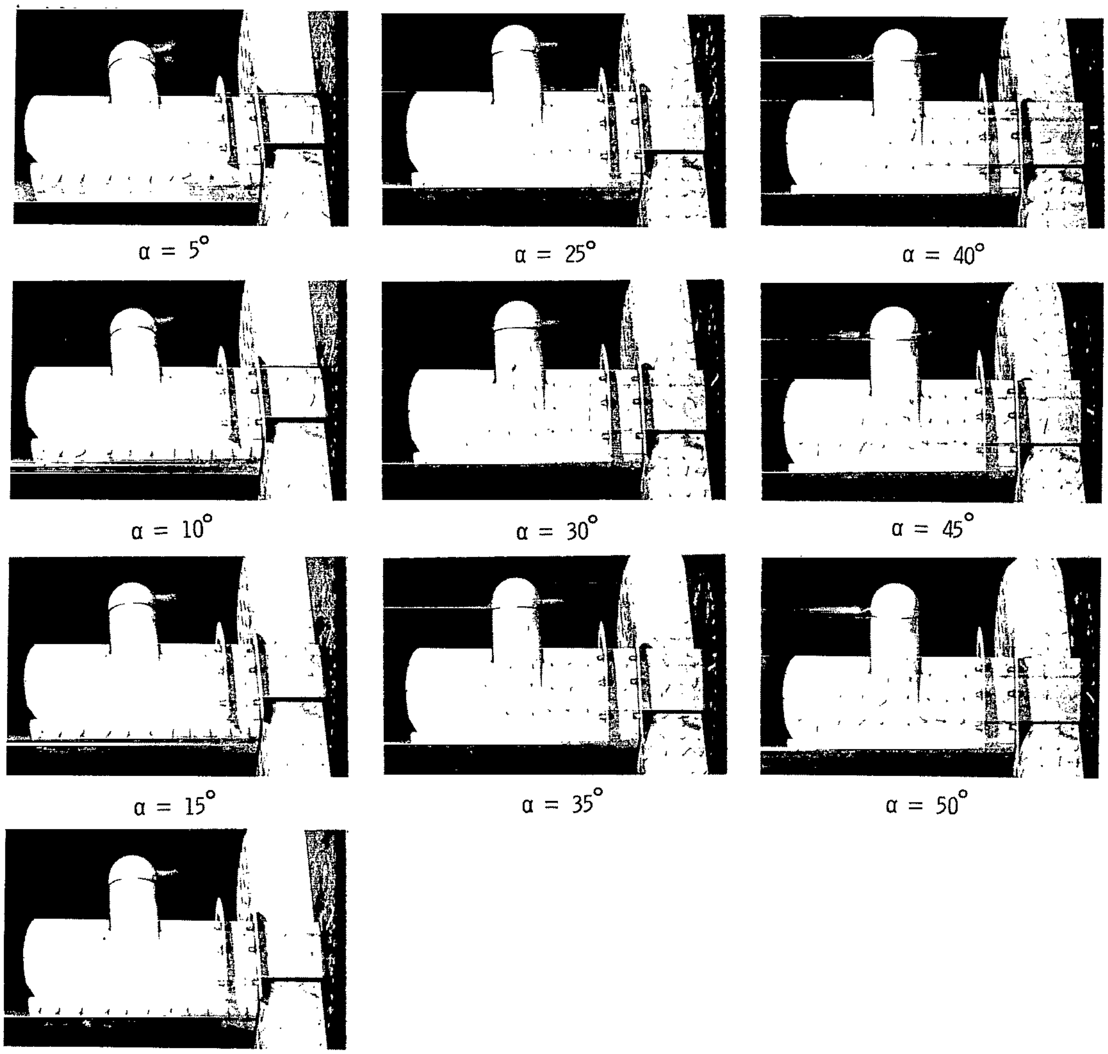
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 13.- Continued.



(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 13.- Continued.



$\alpha = 5^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

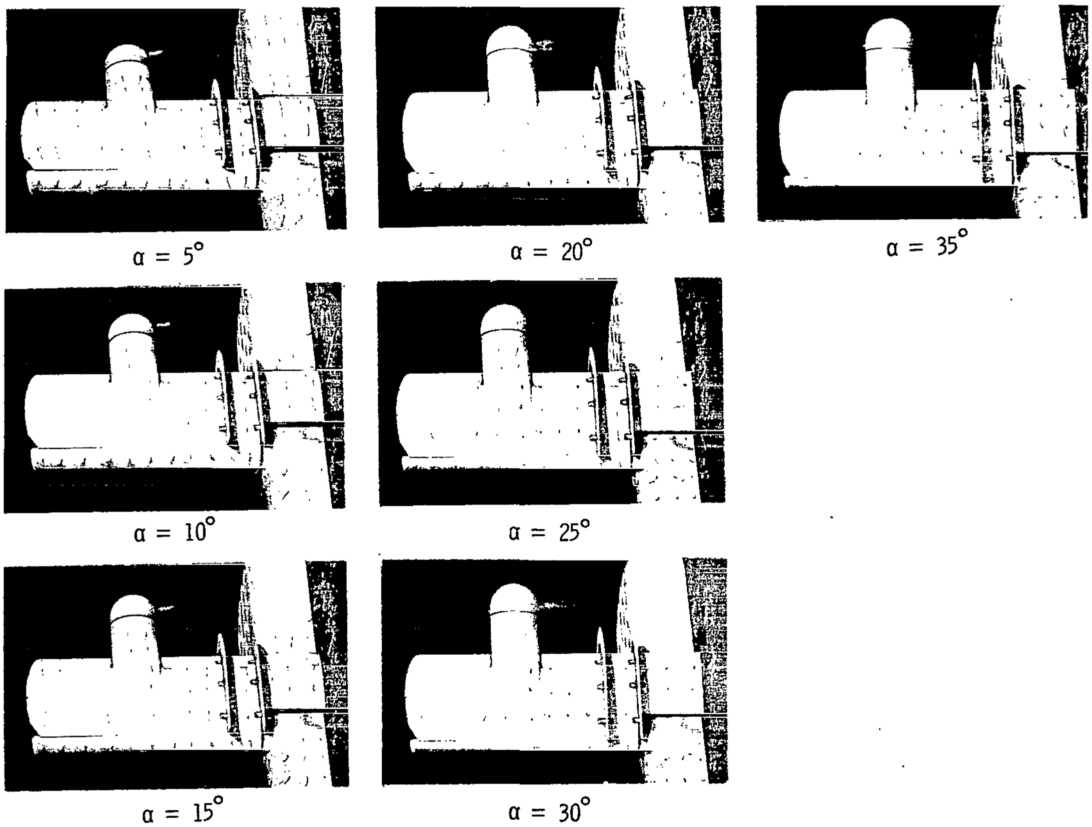
$\alpha = 10^\circ$ $\alpha = 30^\circ$ $\alpha = 45^\circ$

$\alpha = 15^\circ$ $\alpha = 35^\circ$ $\alpha = 50^\circ$

$\alpha = 20^\circ$

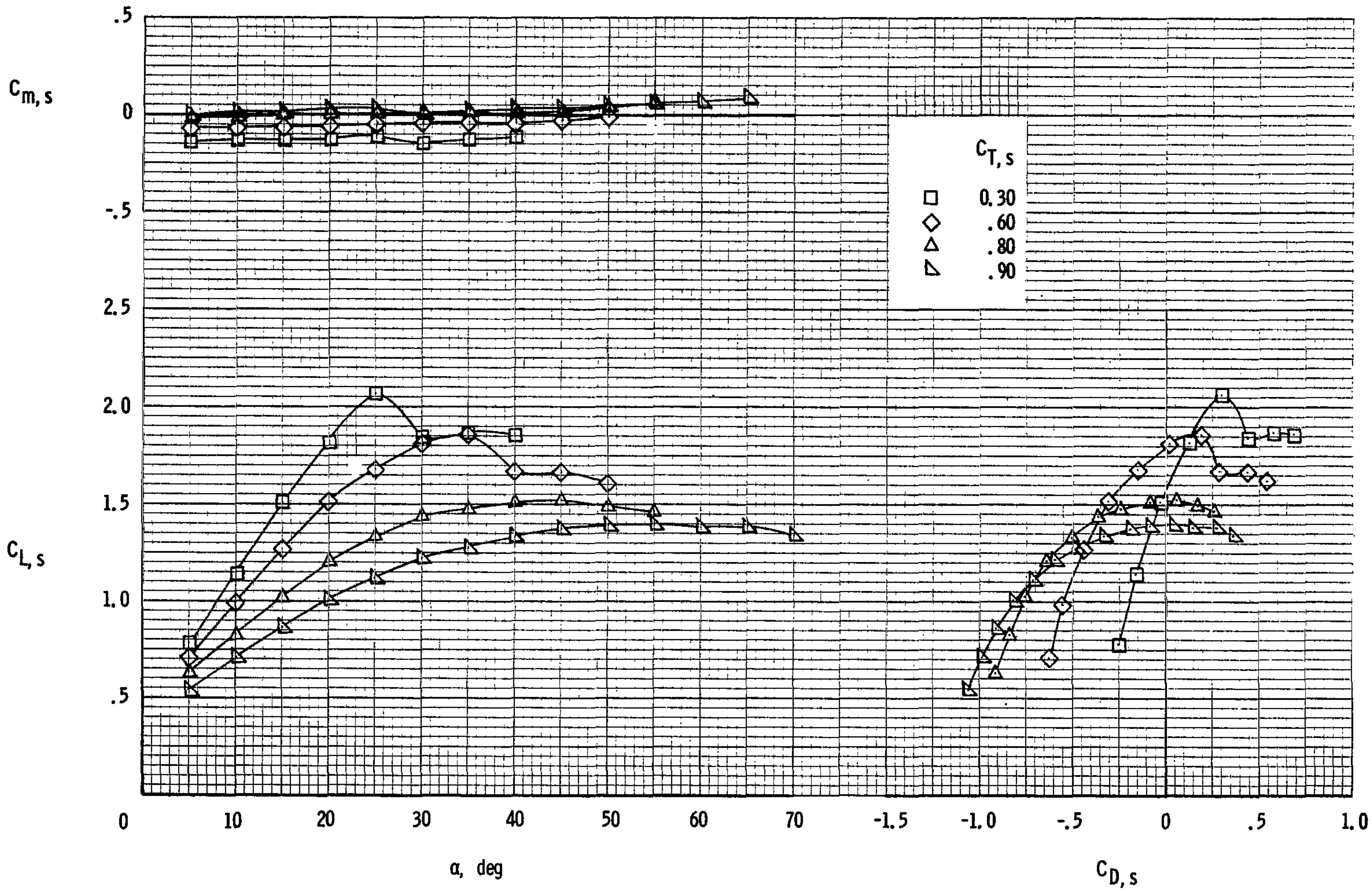
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 13.- Continued.



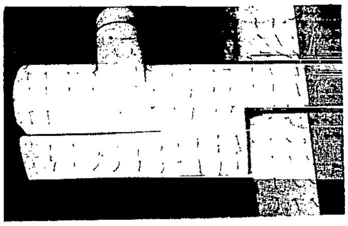
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 13.- Concluded.

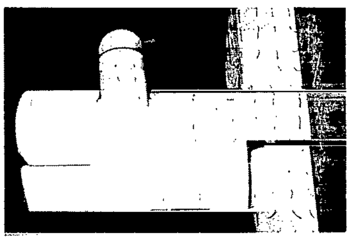


(a) Aerodynamic characteristics.

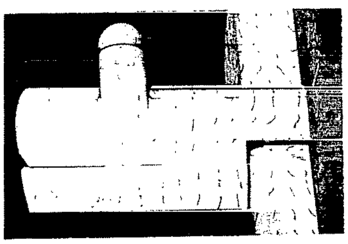
Figure 14.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Inboard slat on; $\delta_f = 20^o$.



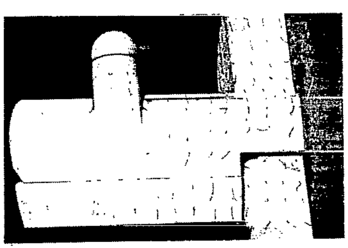
$\alpha = 5^\circ$



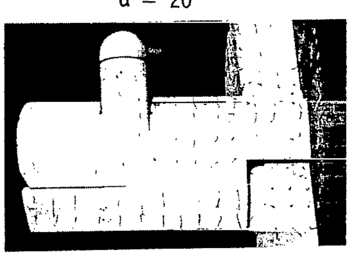
$\alpha = 10^\circ$



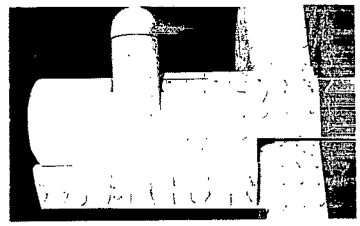
$\alpha = 15^\circ$



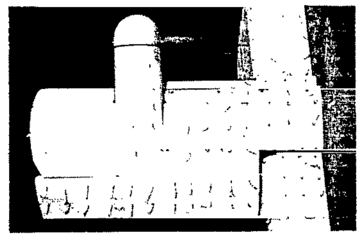
$\alpha = 20^\circ$



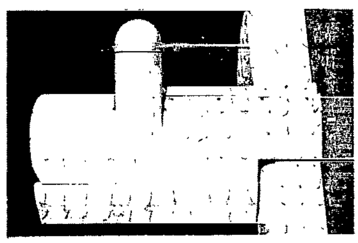
$\alpha = 25^\circ$



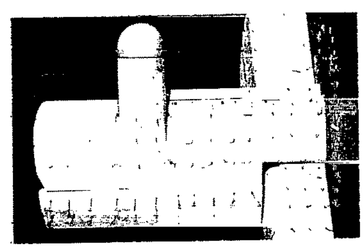
$\alpha = 30^\circ$



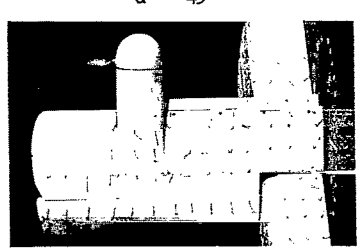
$\alpha = 35^\circ$



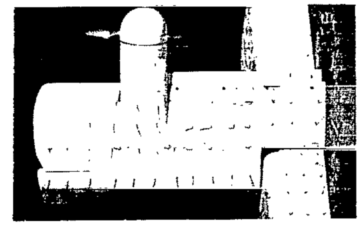
$\alpha = 40^\circ$



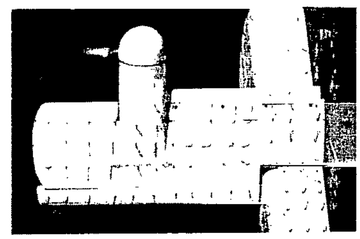
$\alpha = 45^\circ$



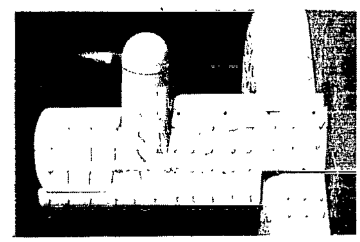
$\alpha = 50^\circ$



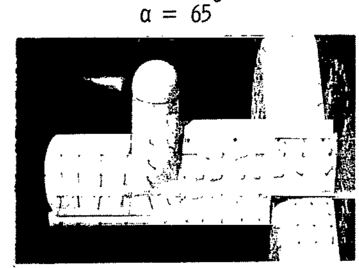
$\alpha = 55^\circ$



$\alpha = 60^\circ$



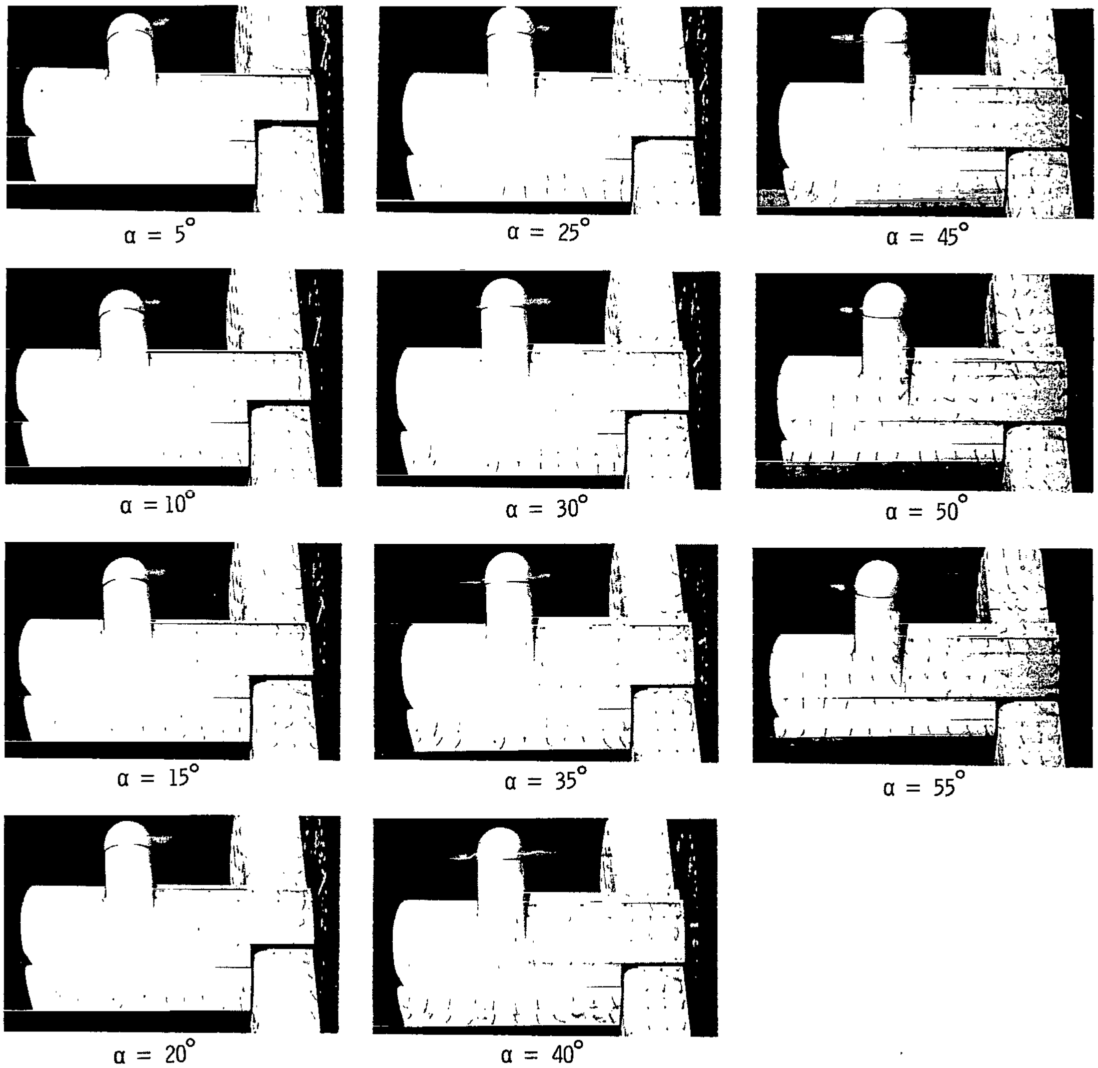
$\alpha = 65^\circ$



$\alpha = 70^\circ$

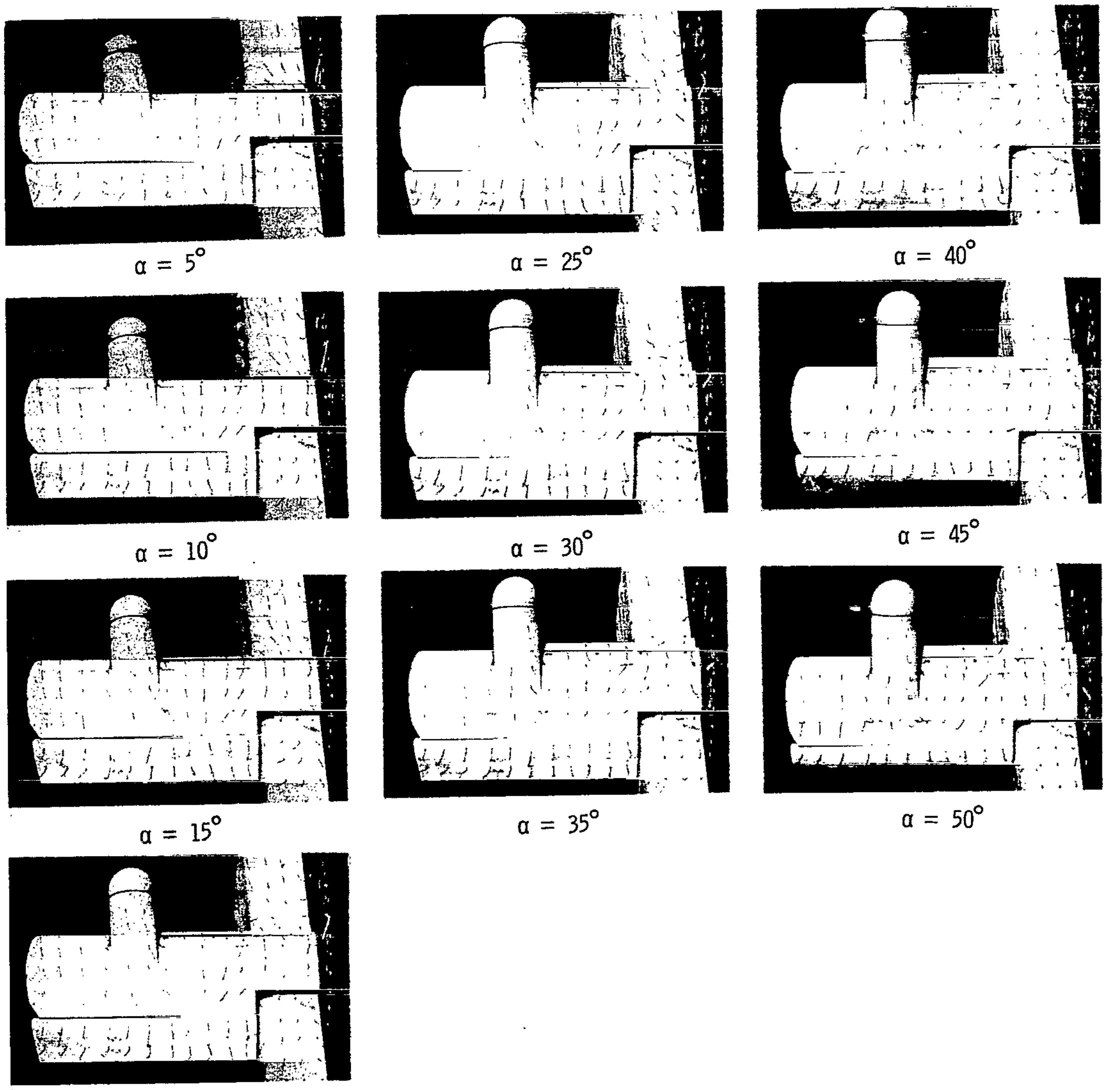
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 14.- Continued.



(c) Flow characteristics; $C_{T,s}$ = 0.80.

Figure 14.- Continued.



$\alpha = 5^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

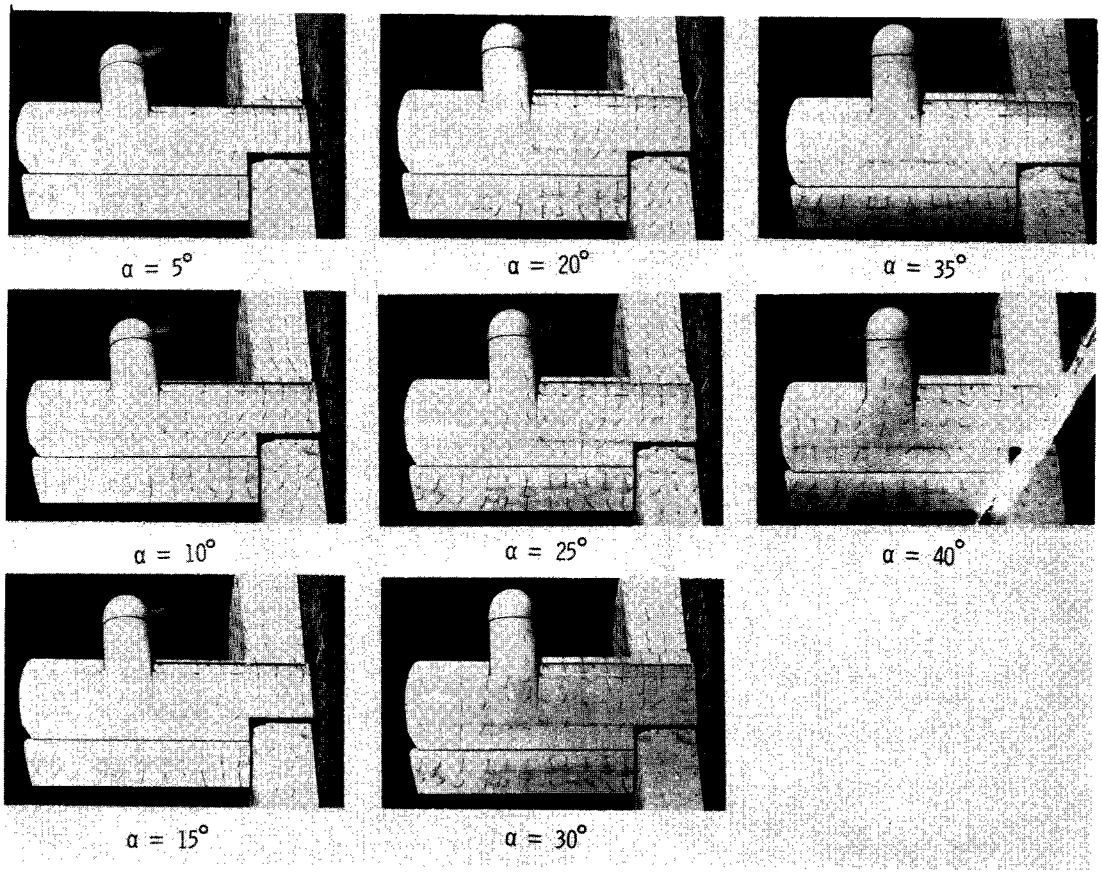
$\alpha = 10^\circ$ $\alpha = 30^\circ$ $\alpha = 45^\circ$

$\alpha = 15^\circ$ $\alpha = 35^\circ$ $\alpha = 50^\circ$

$\alpha = 20^\circ$

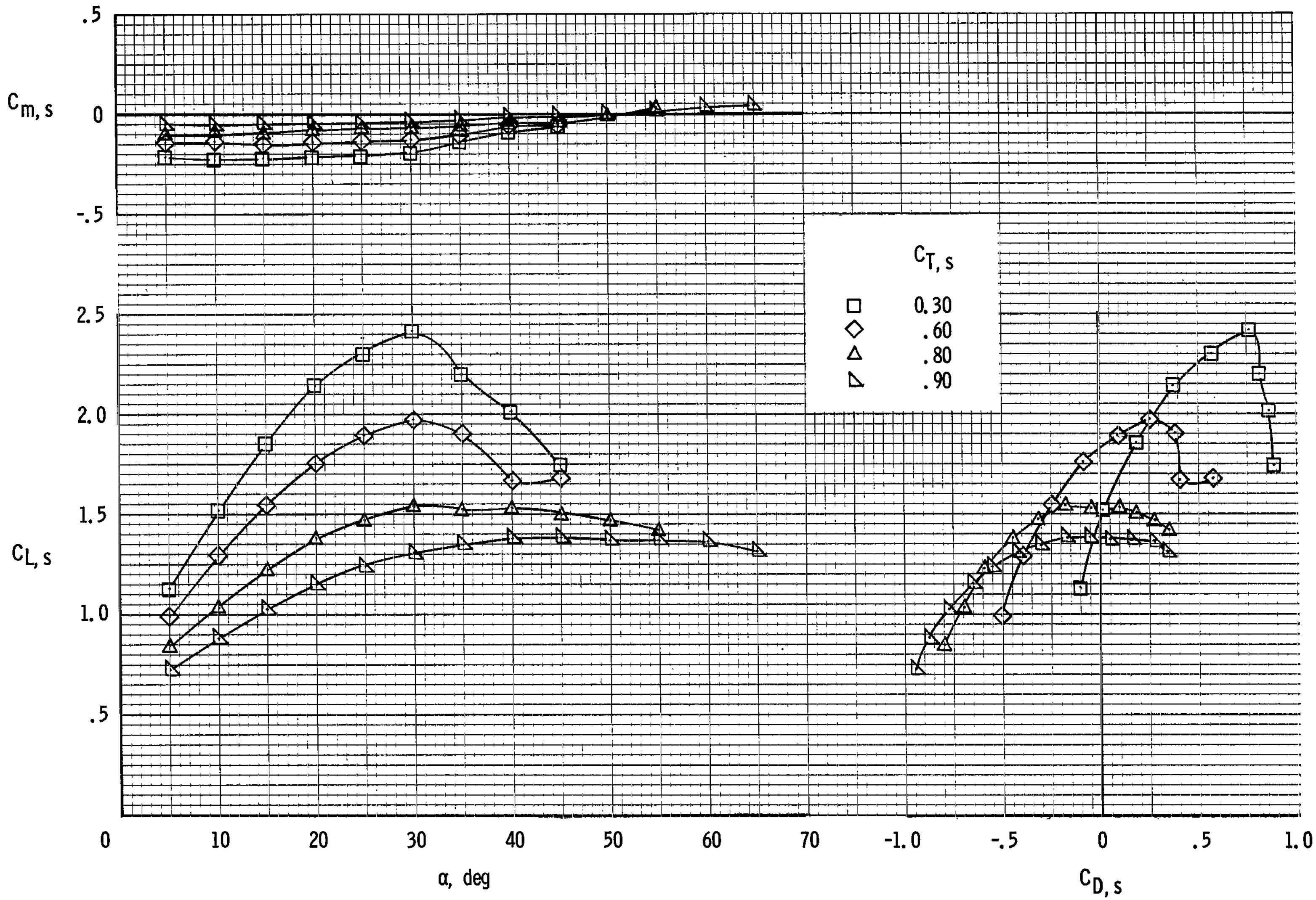
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 14.- Continued.



(e) Flow characteristics; $C_{T,s} = 0.30$.

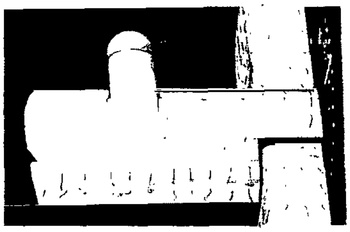
Figure 14.- Concluded.



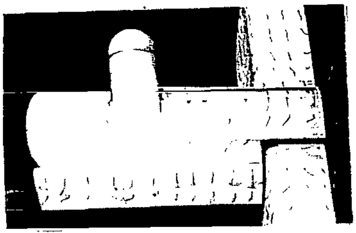
(a) Aerodynamic characteristics.

Figure 15.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Inboard slat on; $\delta_f = 40^0$.

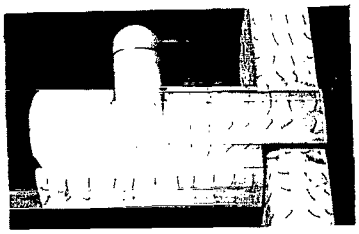
$\alpha = 5^\circ$



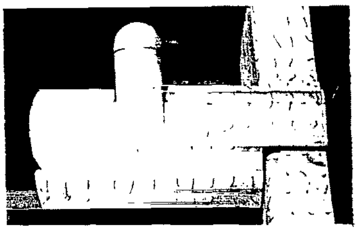
$\alpha = 10^\circ$



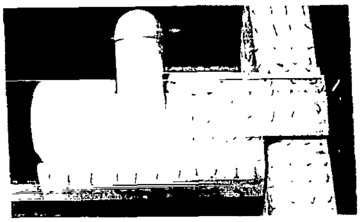
$\alpha = 15^\circ$



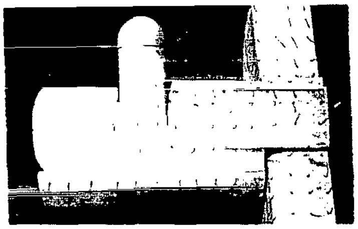
$\alpha = 20^\circ$



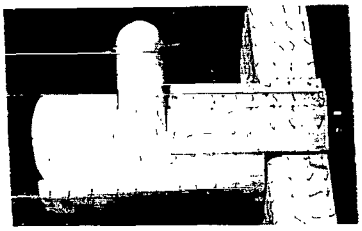
$\alpha = 25^\circ$



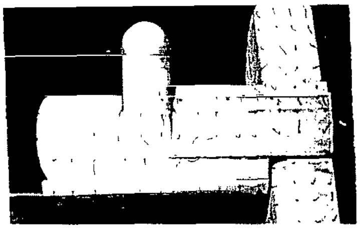
$\alpha = 30^\circ$



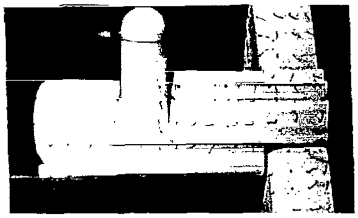
$\alpha = 35^\circ$



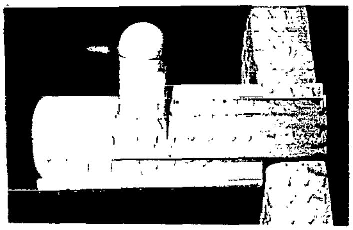
$\alpha = 40^\circ$



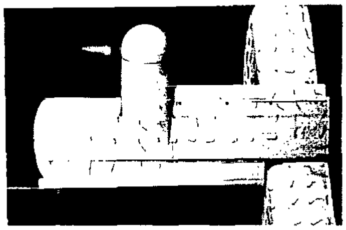
$\alpha = 45^\circ$



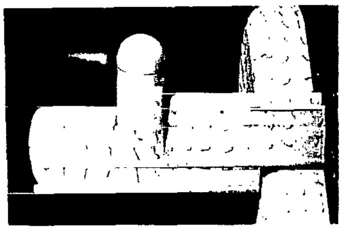
$\alpha = 50^\circ$



$\alpha = 55^\circ$



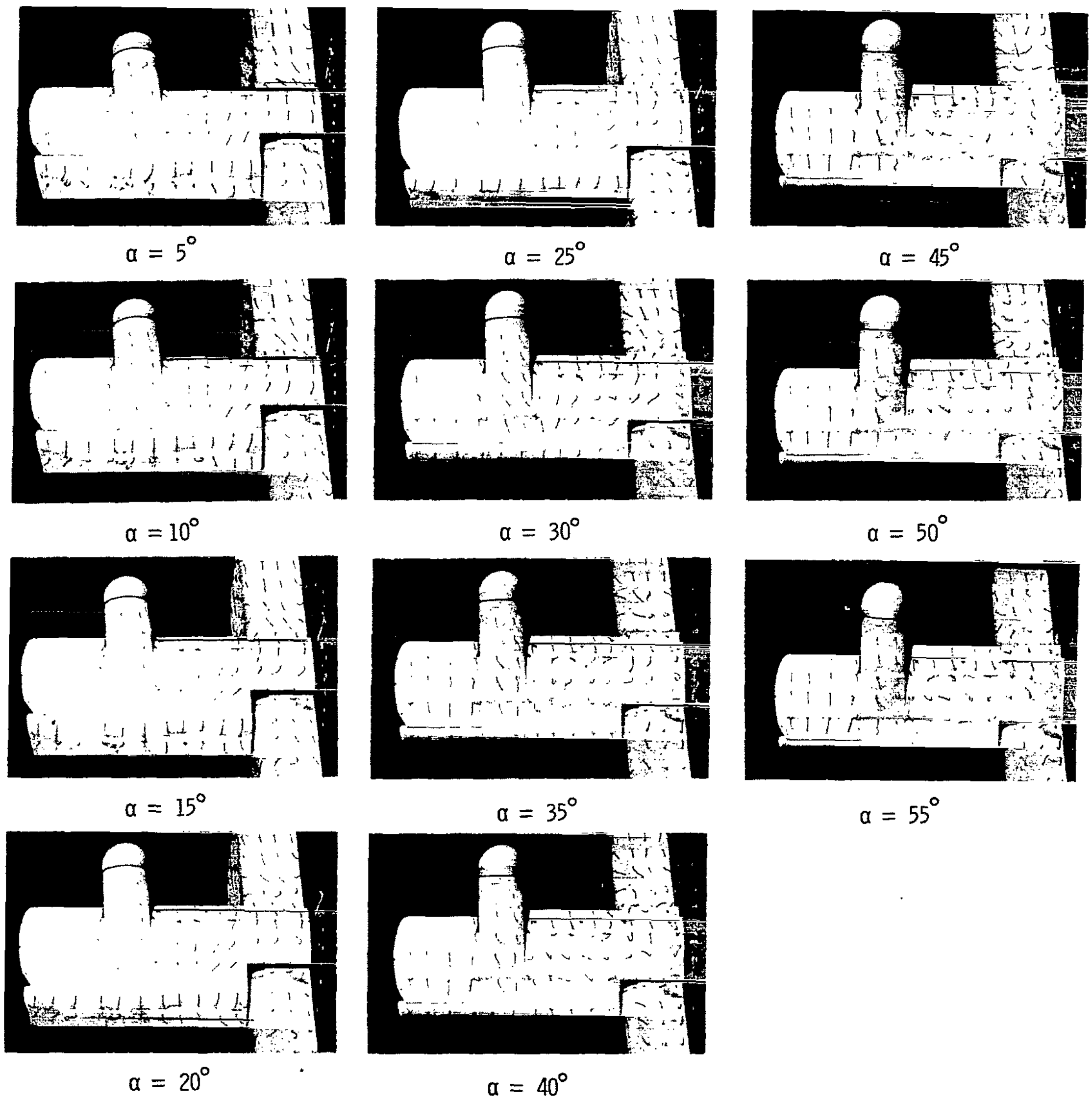
$\alpha = 60^\circ$



$\alpha = 65^\circ$

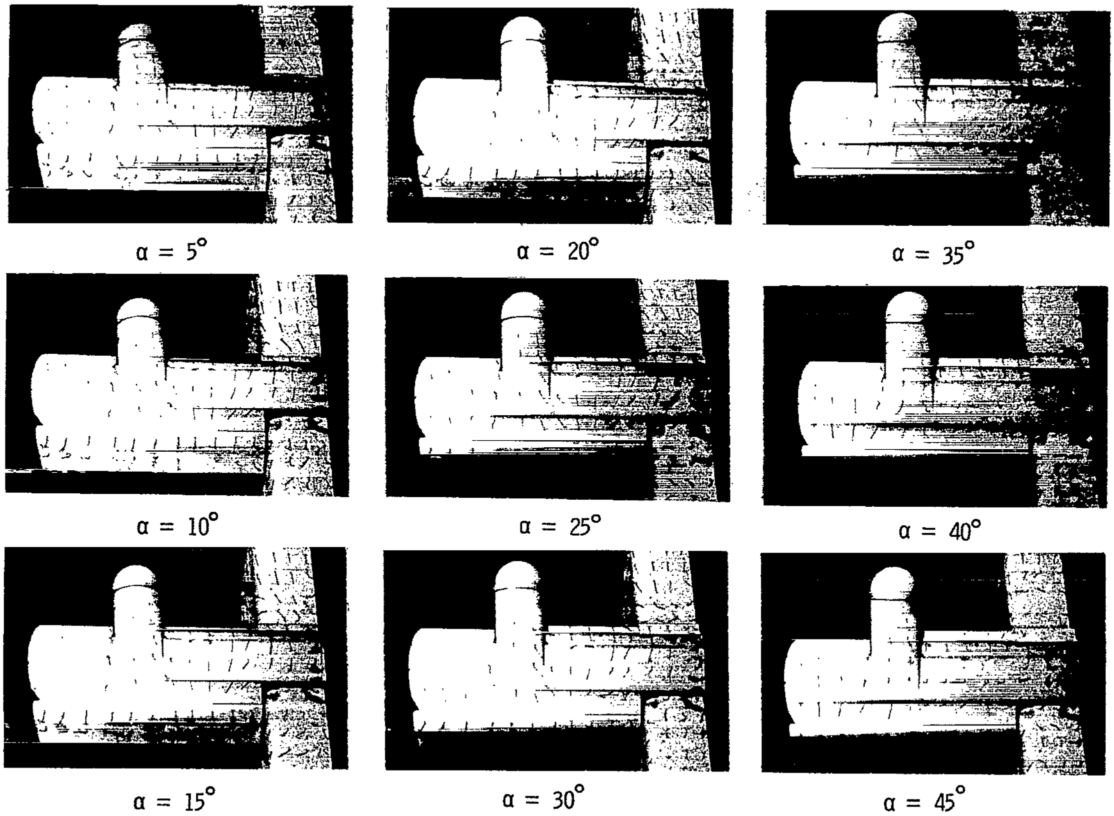
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 15.- Continued.



(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 15.- Continued.



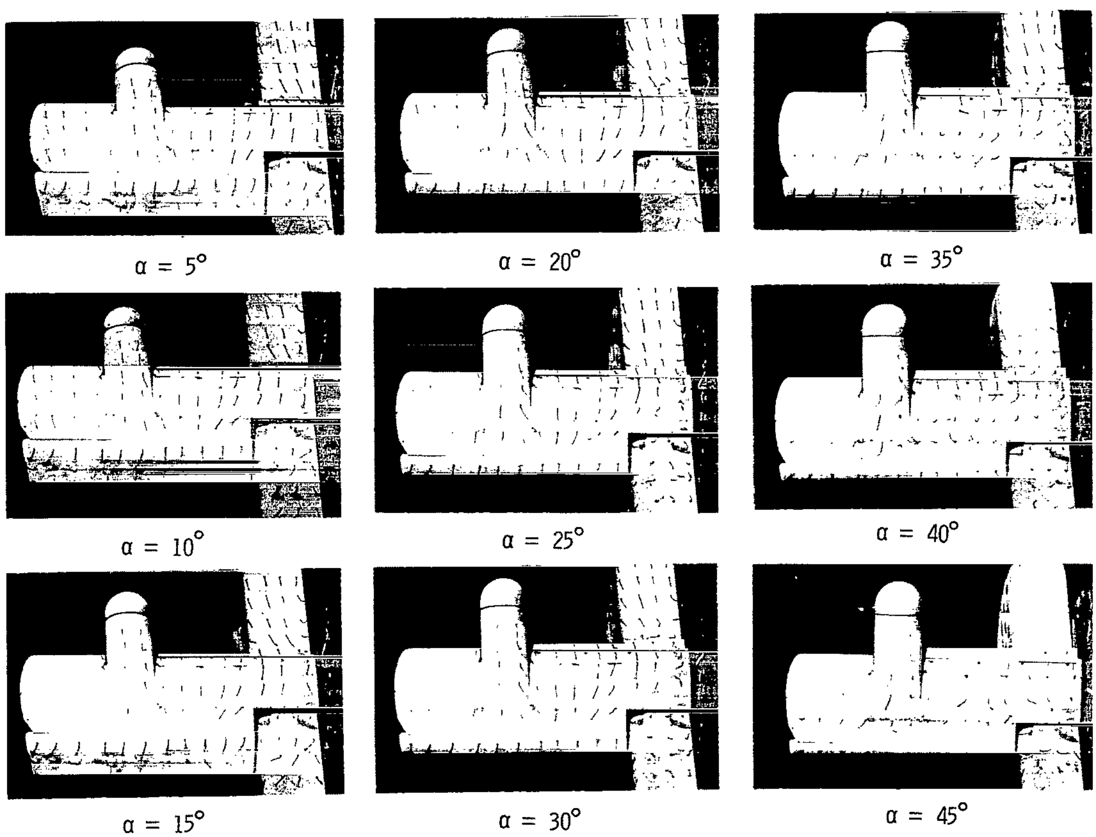
$\alpha = 5^\circ$ $\alpha = 20^\circ$ $\alpha = 35^\circ$

$\alpha = 10^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

$\alpha = 15^\circ$ $\alpha = 30^\circ$ $\alpha = 45^\circ$

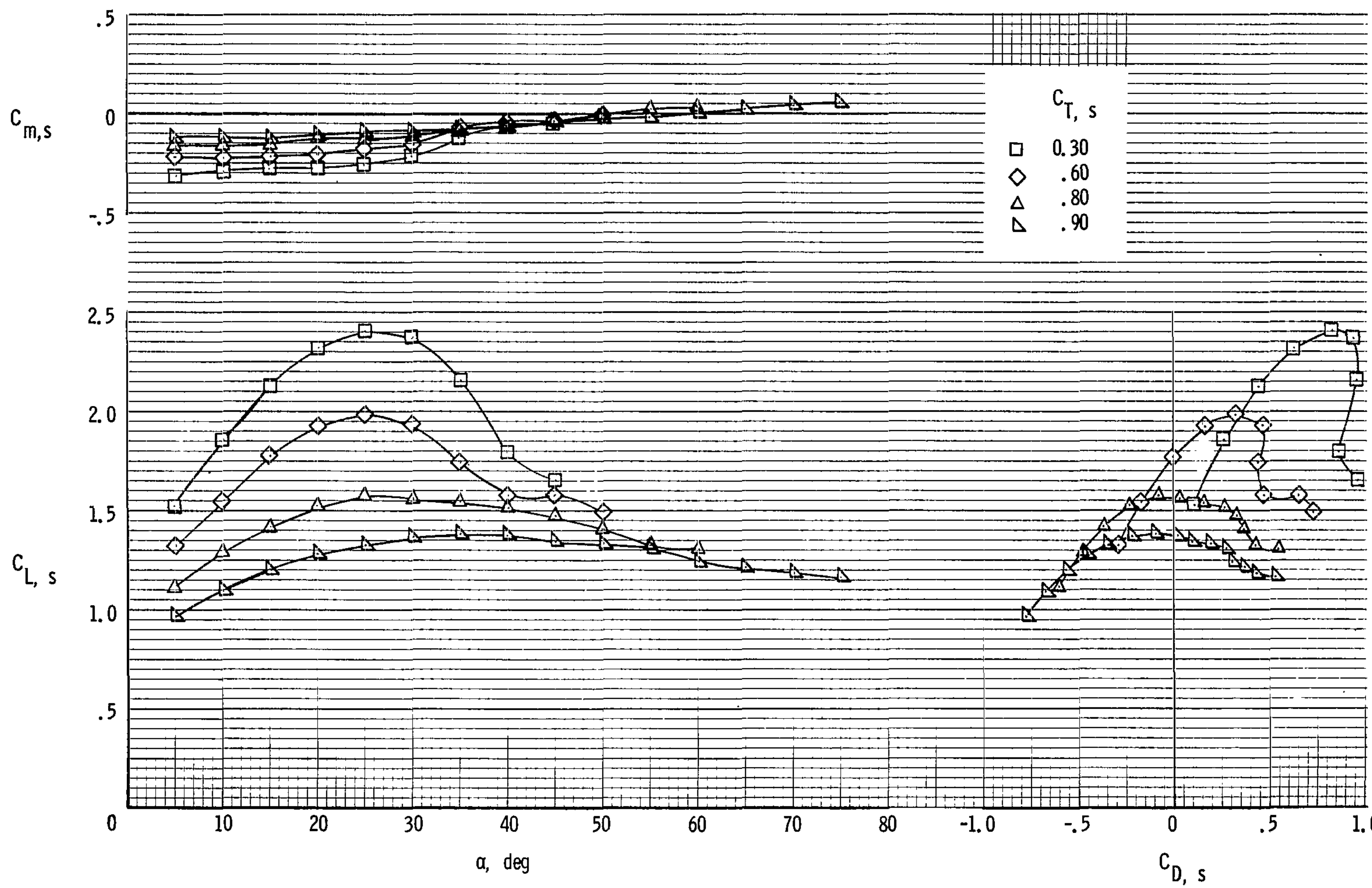
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 15.- Continued.



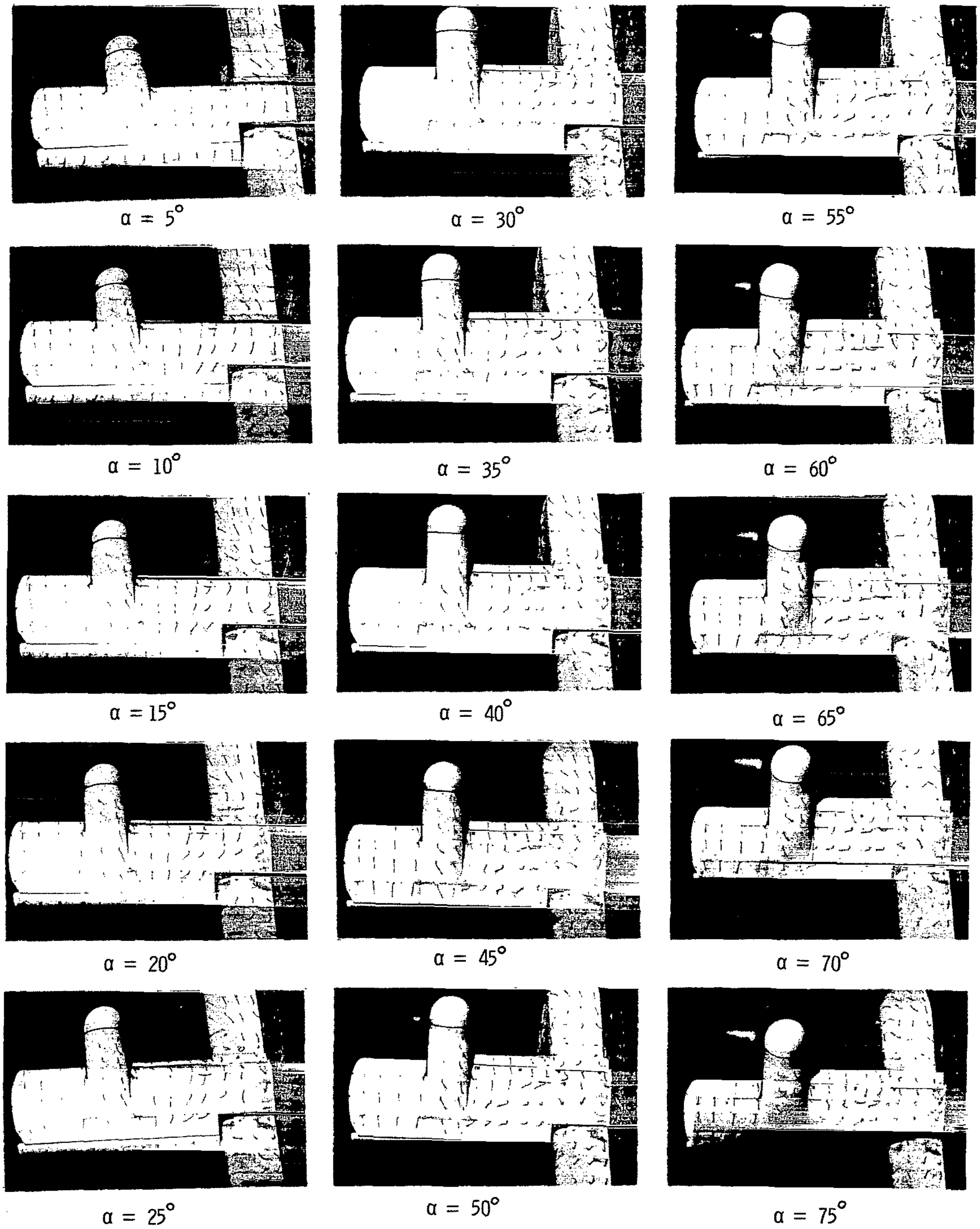
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 15.- Concluded.



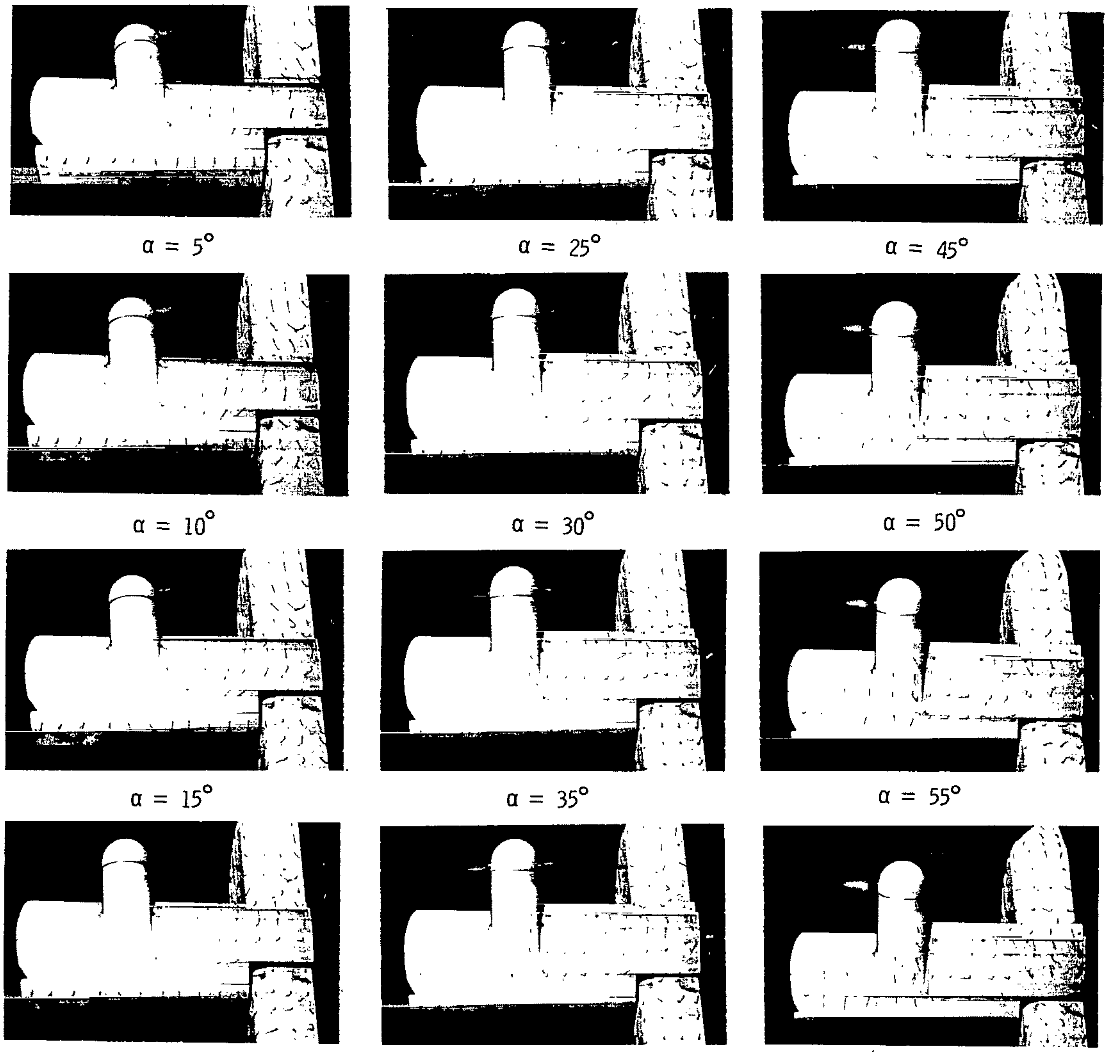
(a) Aerodynamic characteristics.

Figure 16.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Inboard slat on; $\delta_f = 60^0$.



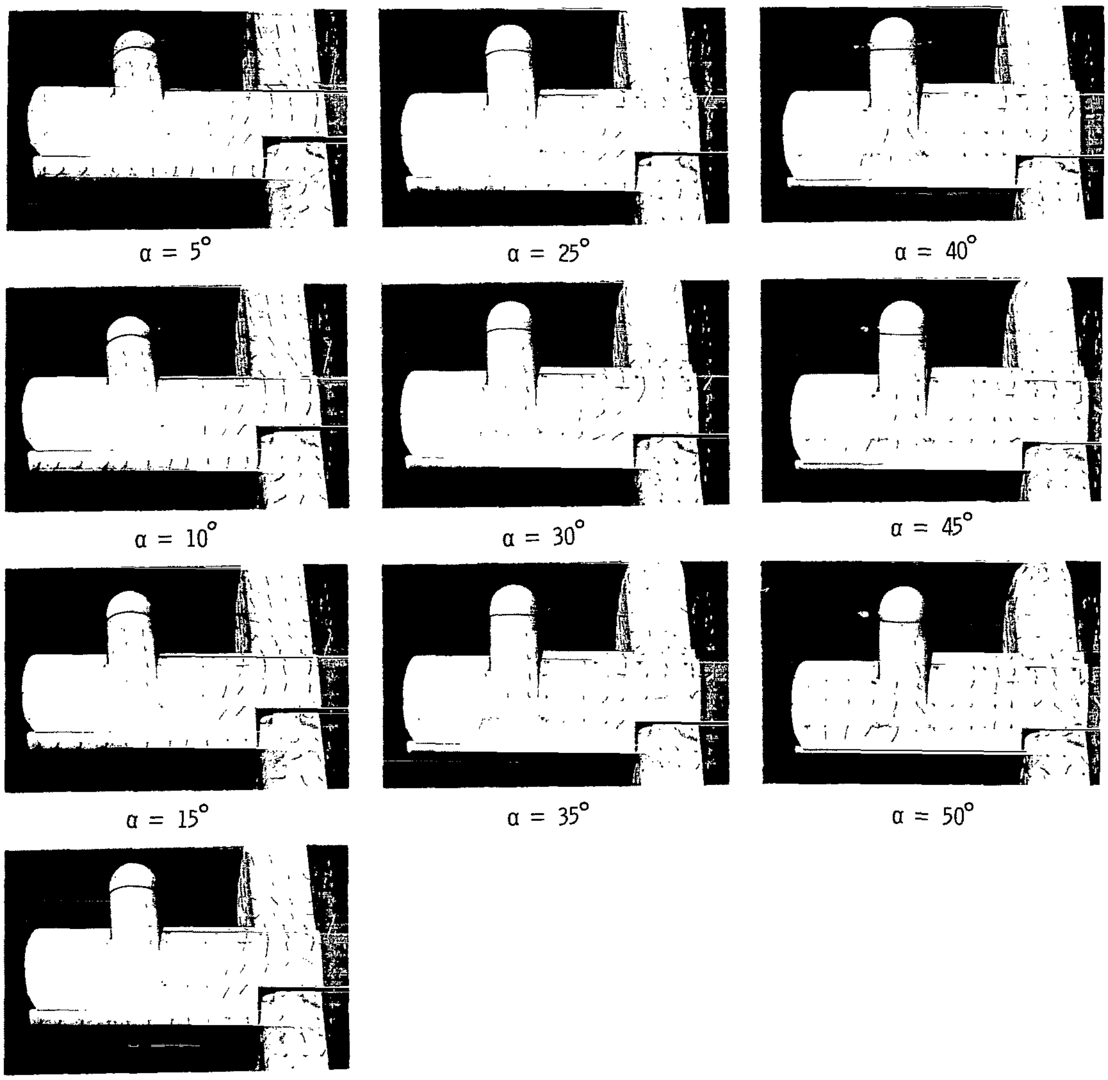
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 16.- Continued.



(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 16.- Continued.



$\alpha = 5^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

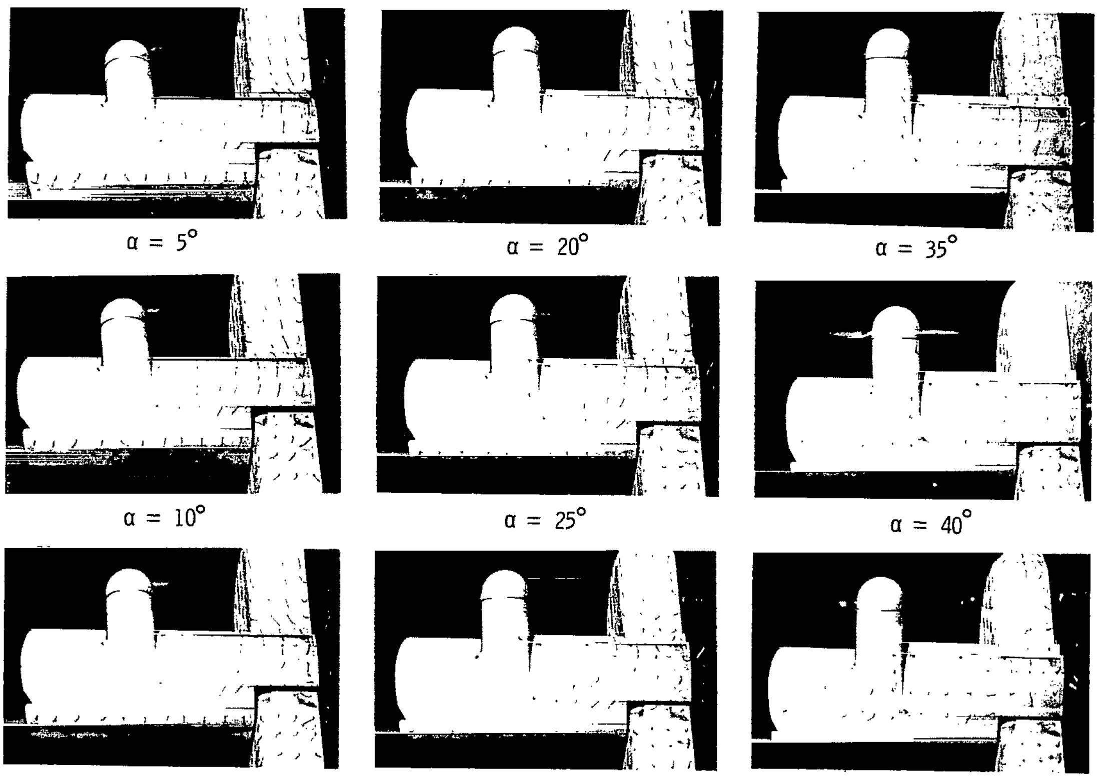
$\alpha = 10^\circ$ $\alpha = 30^\circ$ $\alpha = 45^\circ$

$\alpha = 15^\circ$ $\alpha = 35^\circ$ $\alpha = 50^\circ$

$\alpha = 20^\circ$

(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 16.- Continued.



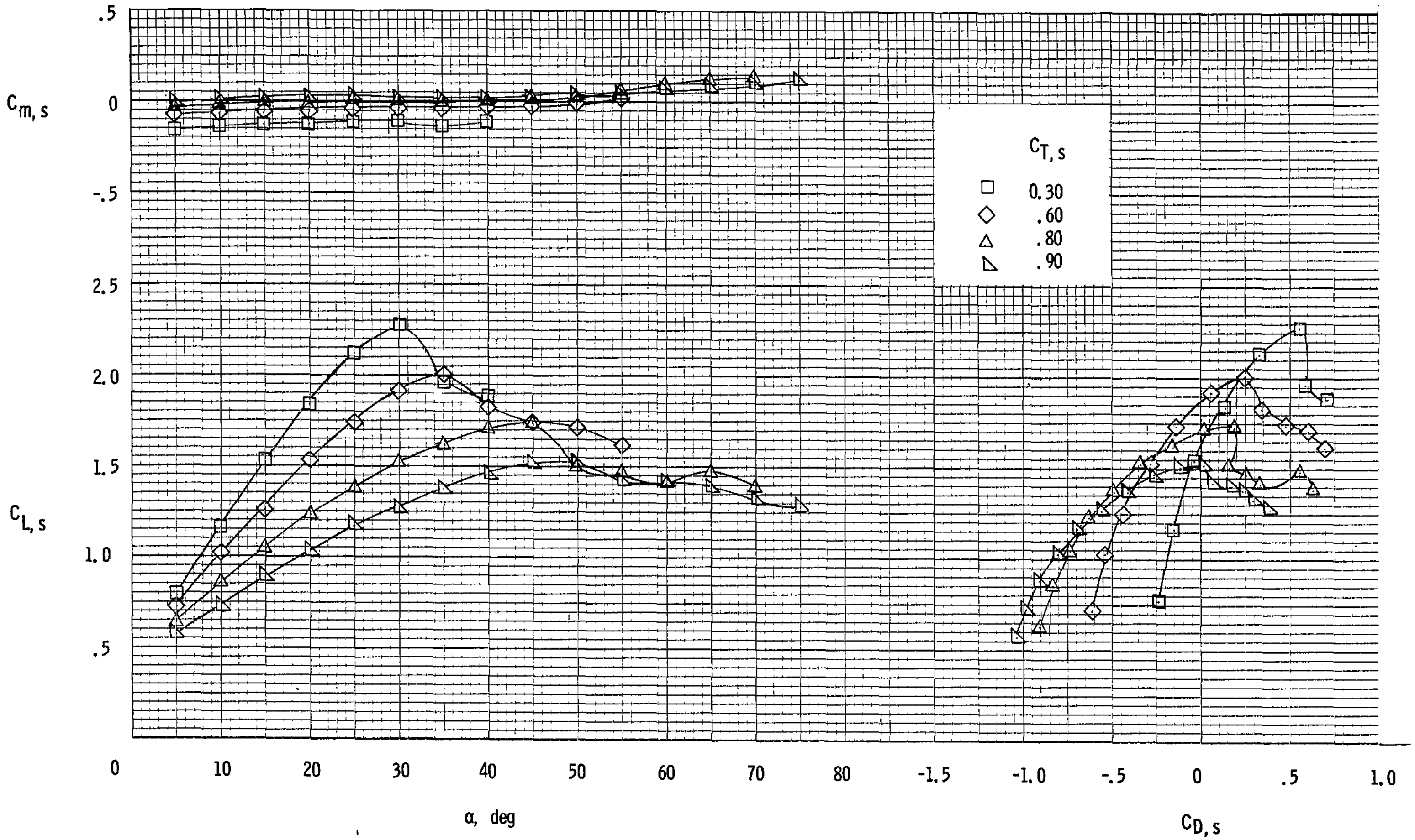
$\alpha = 5^\circ$ | $\alpha = 20^\circ$ | $\alpha = 35^\circ$

$\alpha = 10^\circ$ | $\alpha = 25^\circ$ | $\alpha = 40^\circ$

$\alpha = 15^\circ$ | $\alpha = 30^\circ$ | $\alpha = 45^\circ$

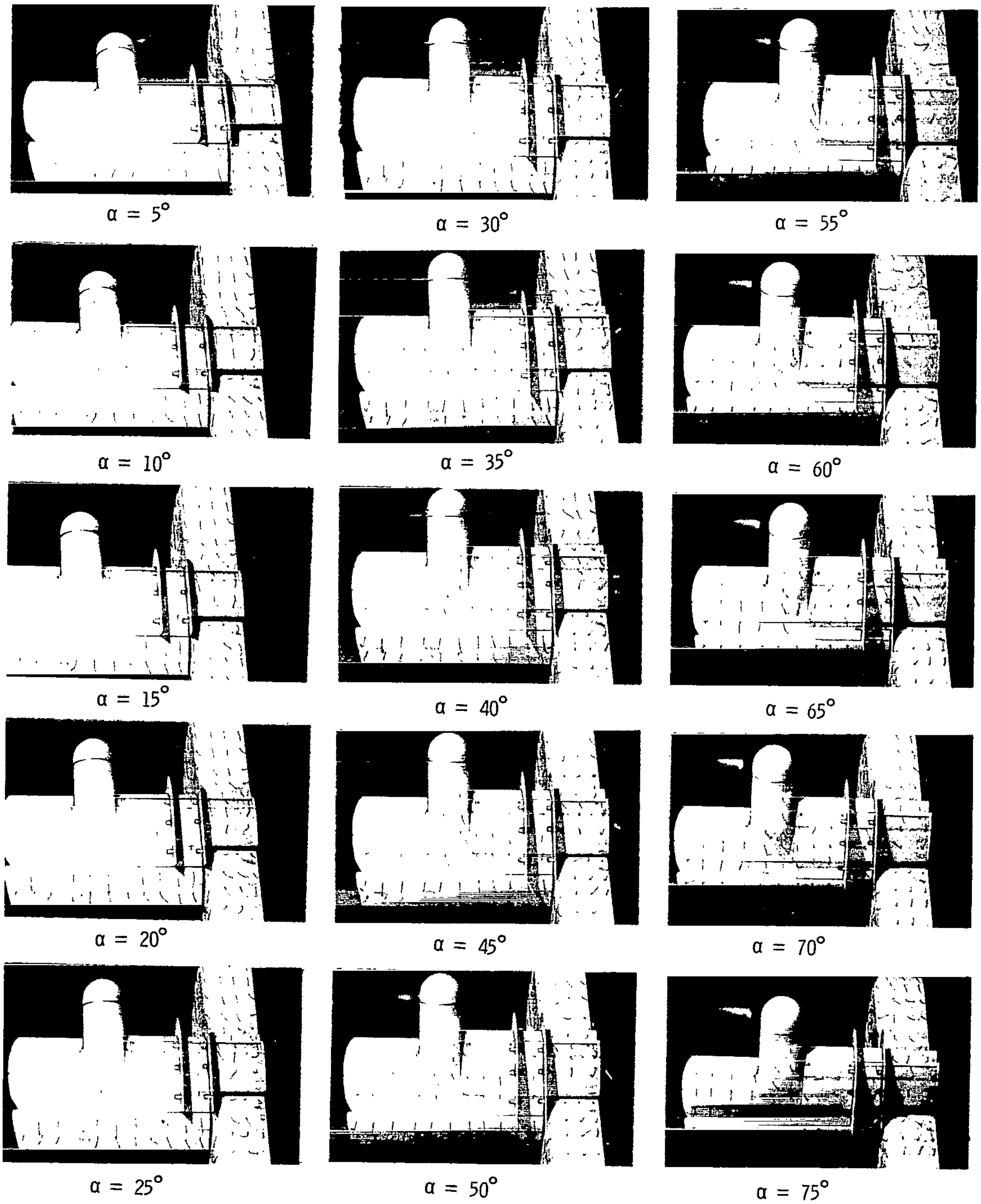
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 16.- Concluded.



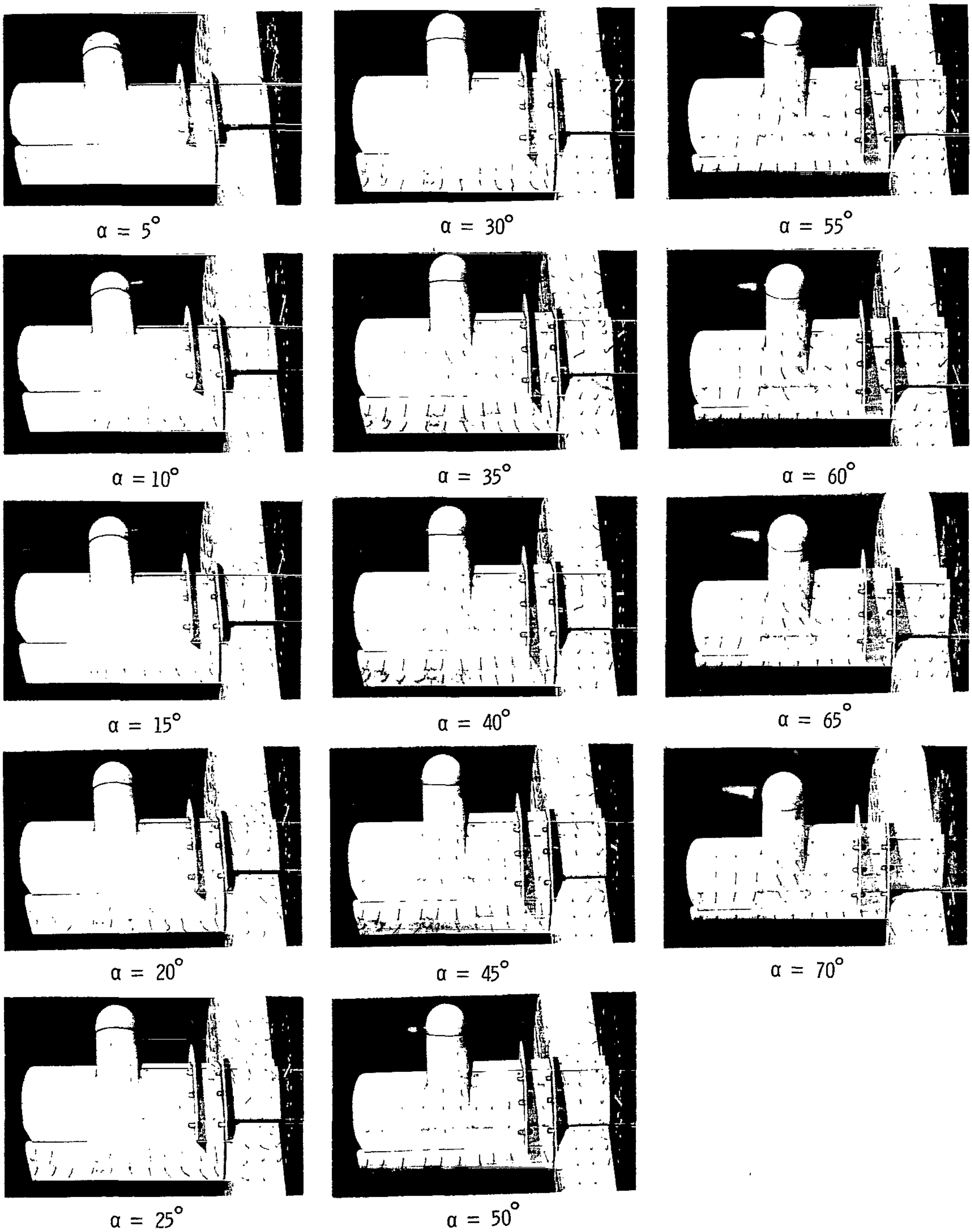
(a) Aerodynamic characteristics.

Figure 17.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Inboard slat on; fences on; $\delta_f = 20^0$.



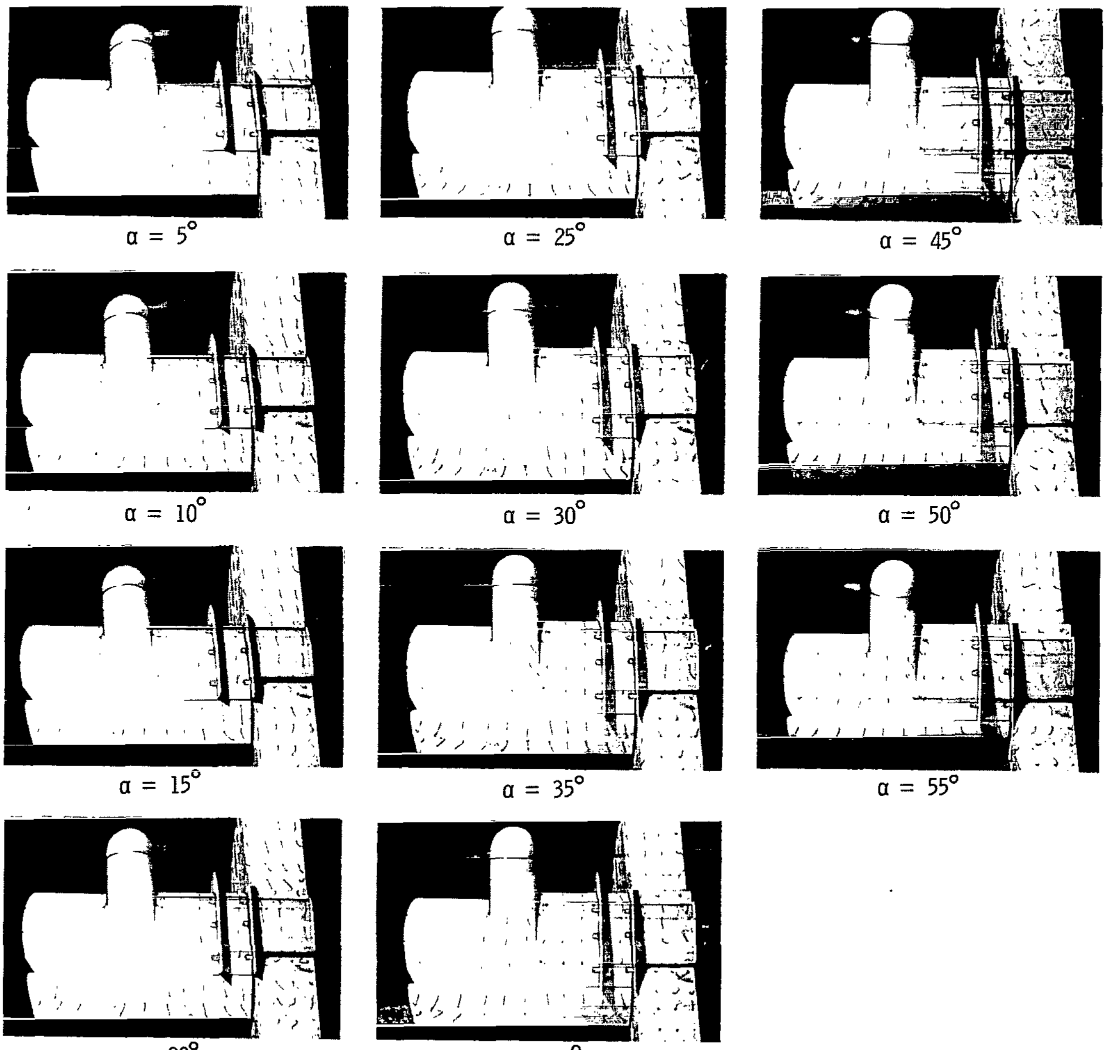
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 17.- Continued.



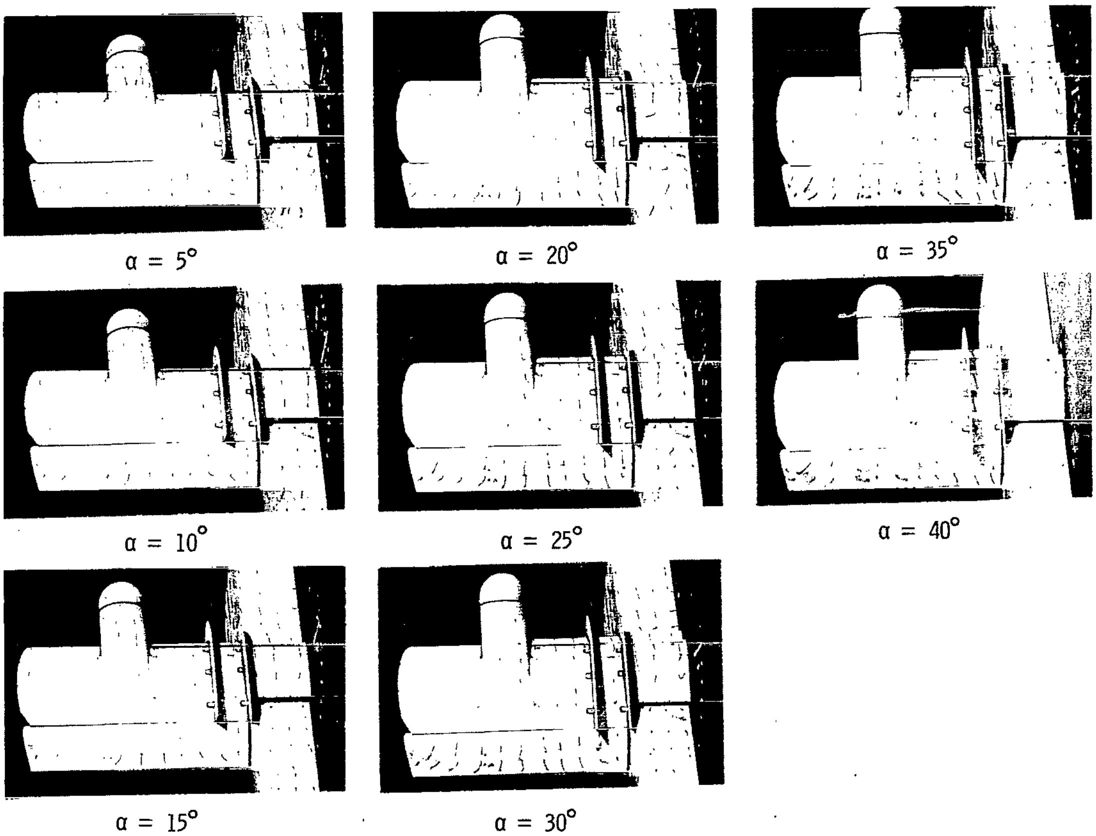
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 17.- Continued.



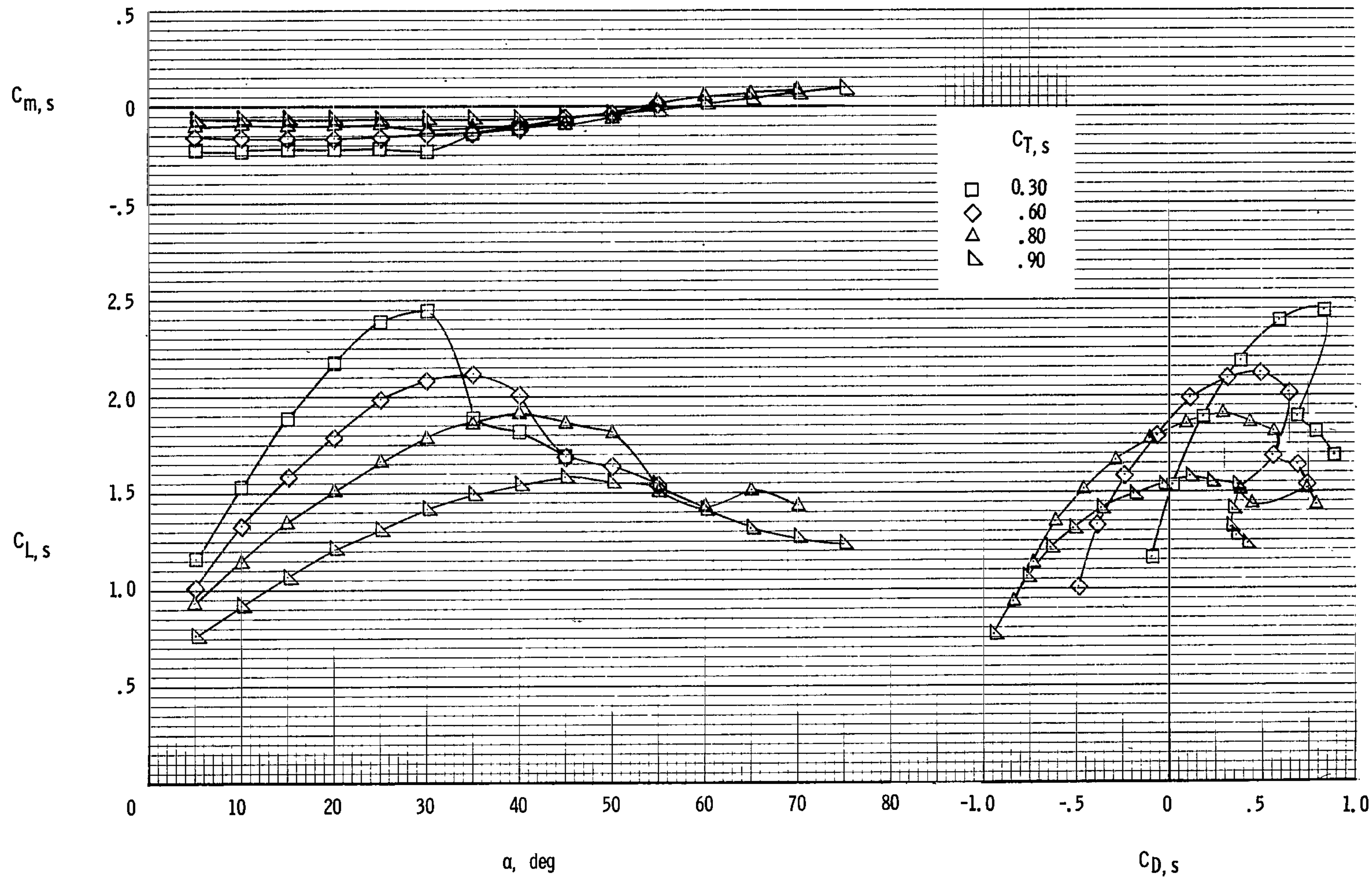
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 17.- Continued.



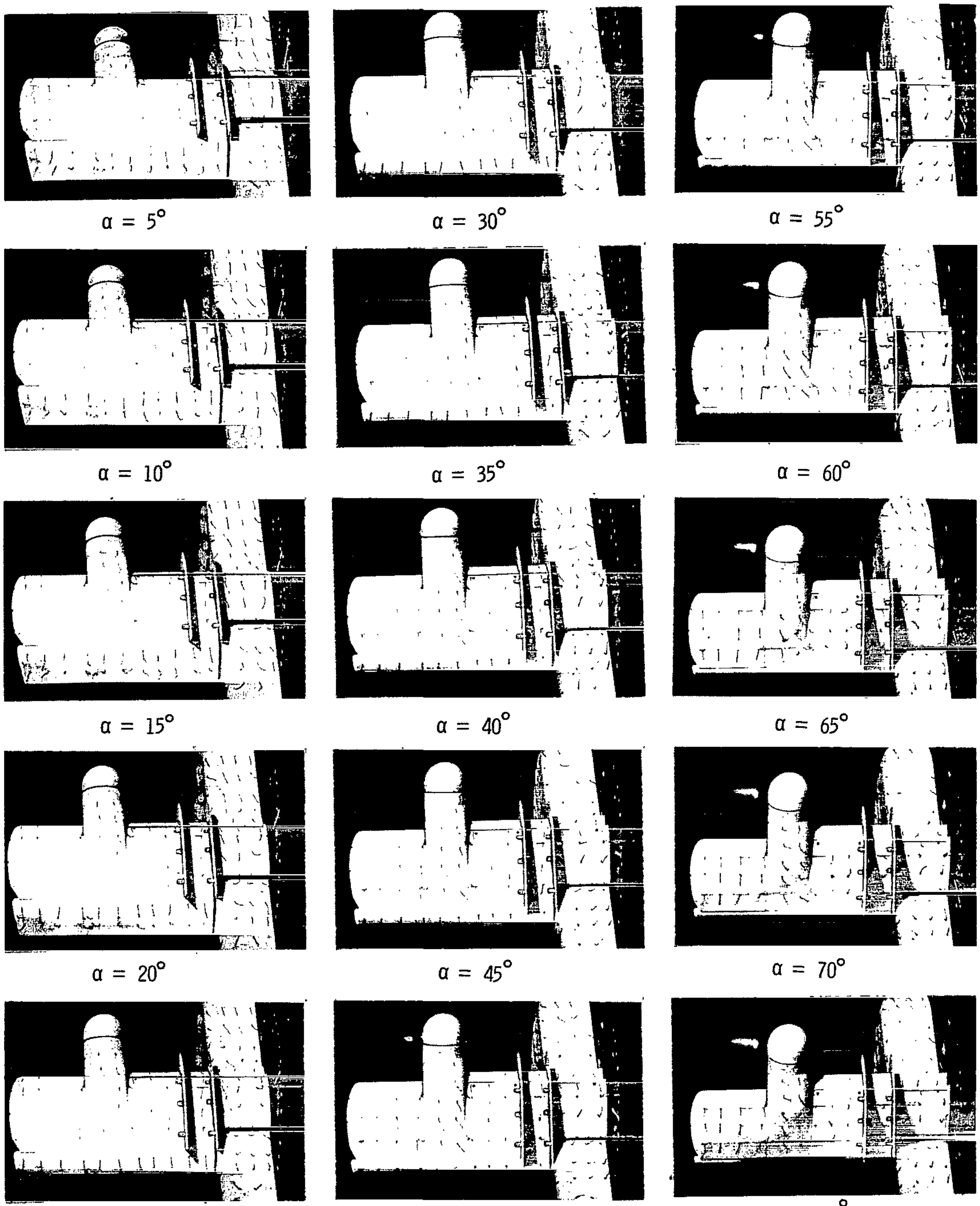
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 17.- Concluded.



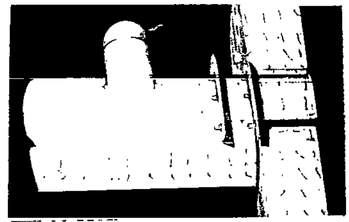
(a) Aerodynamic characteristics.

Figure 18.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Inboard slat on; fences on; $\delta_f = 40^{\circ}$.

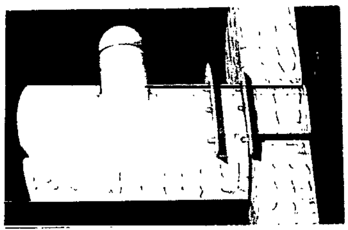


(b) Flow characteristics; $C_{T,s} = 0.90$.

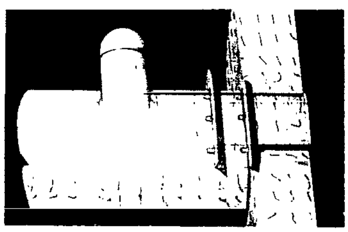
Figure 18.- Continued.



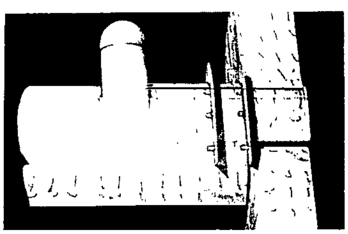
$\alpha = 5^\circ$



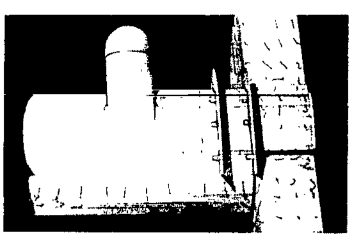
$\alpha = 10^\circ$



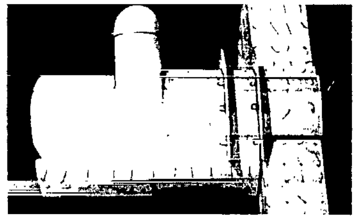
$\alpha = 15^\circ$



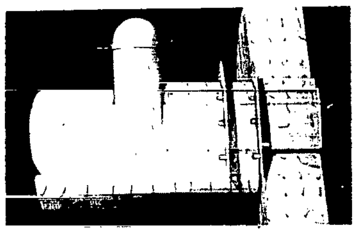
$\alpha = 20^\circ$



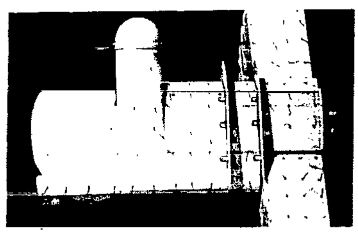
$\alpha = 25^\circ$



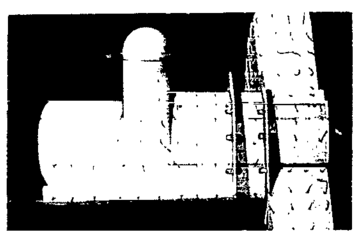
$\alpha = 30^\circ$



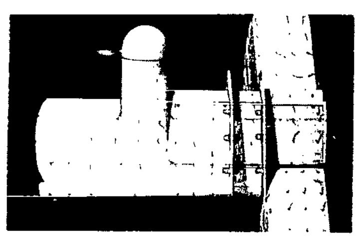
$\alpha = 35^\circ$



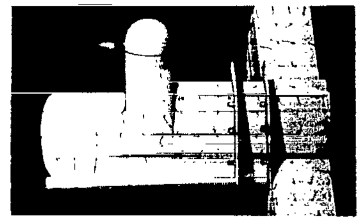
$\alpha = 40^\circ$



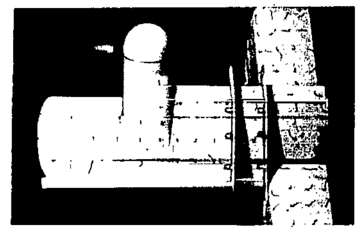
$\alpha = 45^\circ$



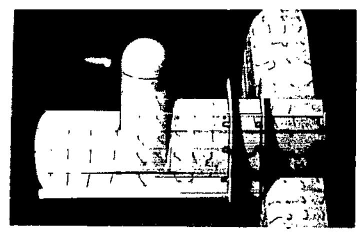
$\alpha = 50^\circ$



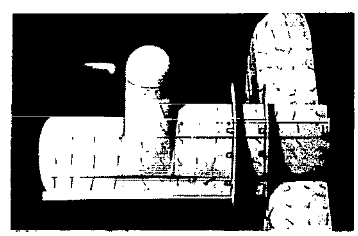
$\alpha = 55^\circ$



$\alpha = 60^\circ$



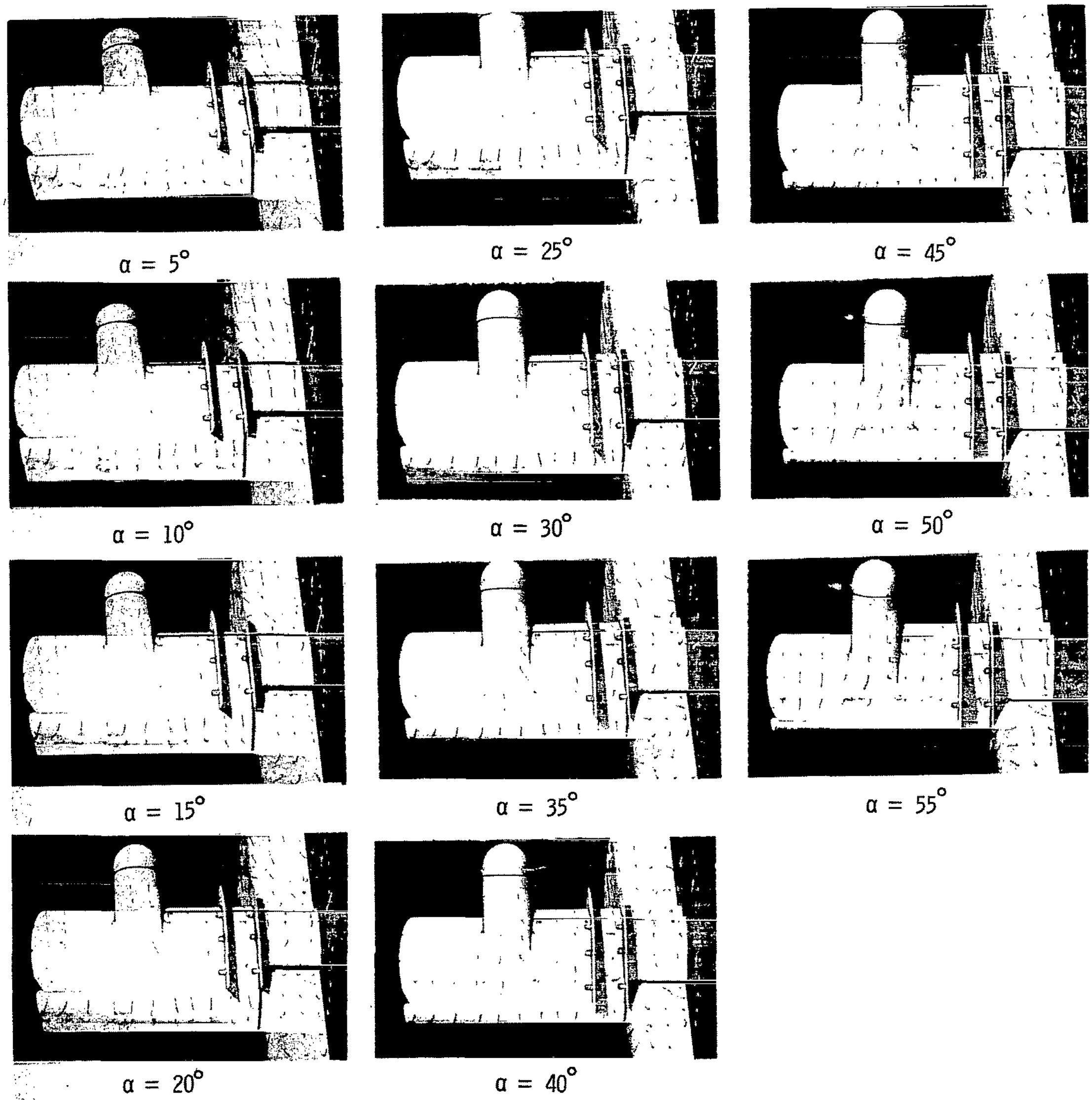
$\alpha = 65^\circ$



$\alpha = 70^\circ$

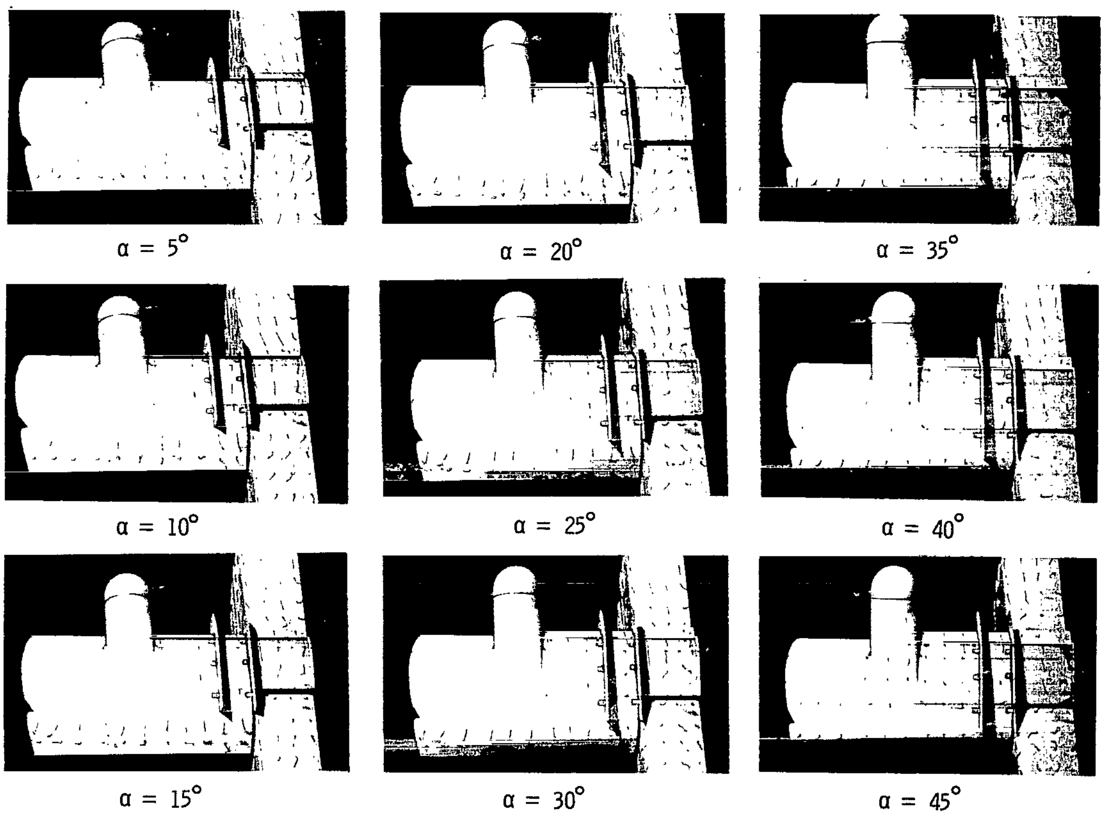
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 18.- Continued.



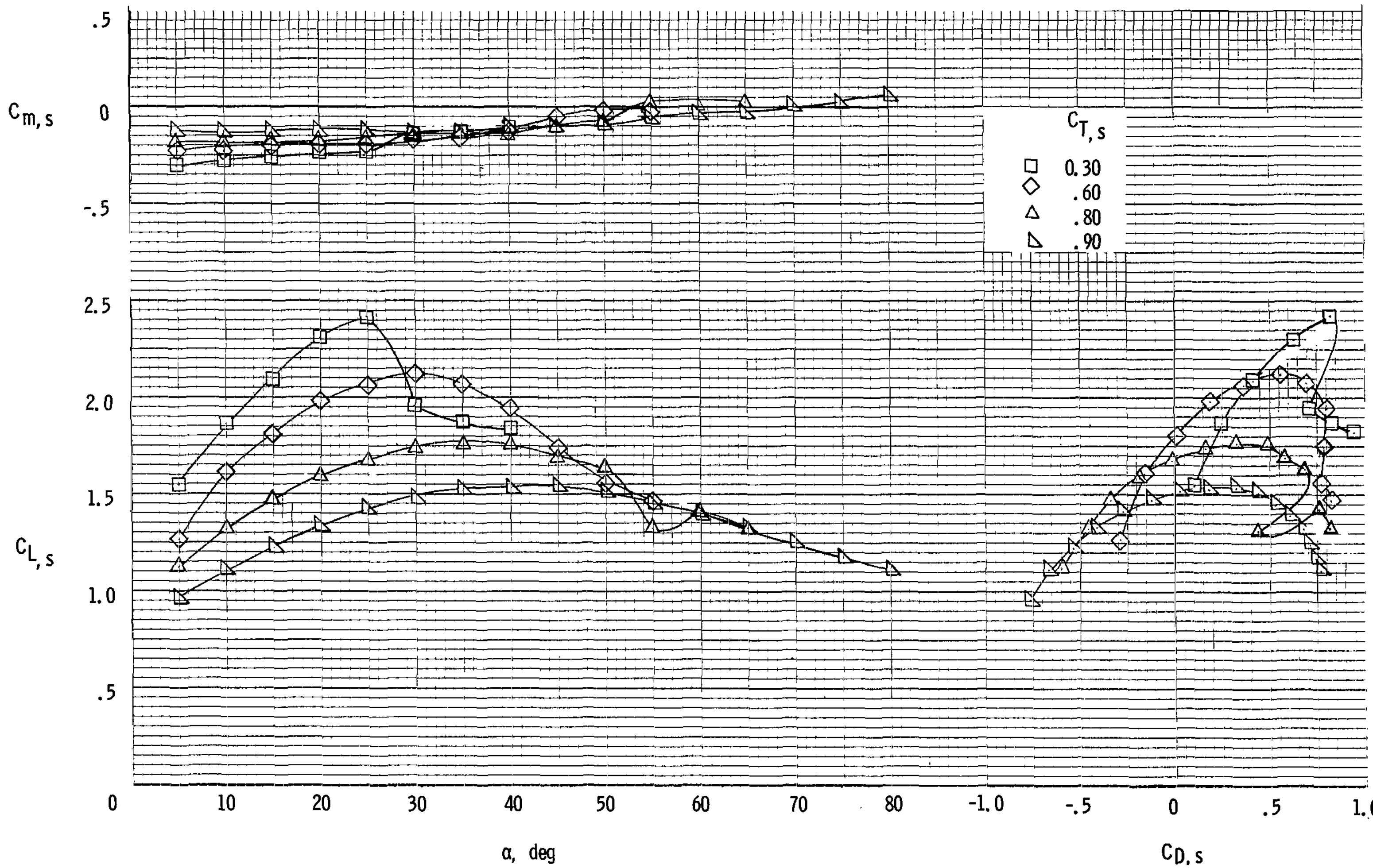
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 18.- Continued.



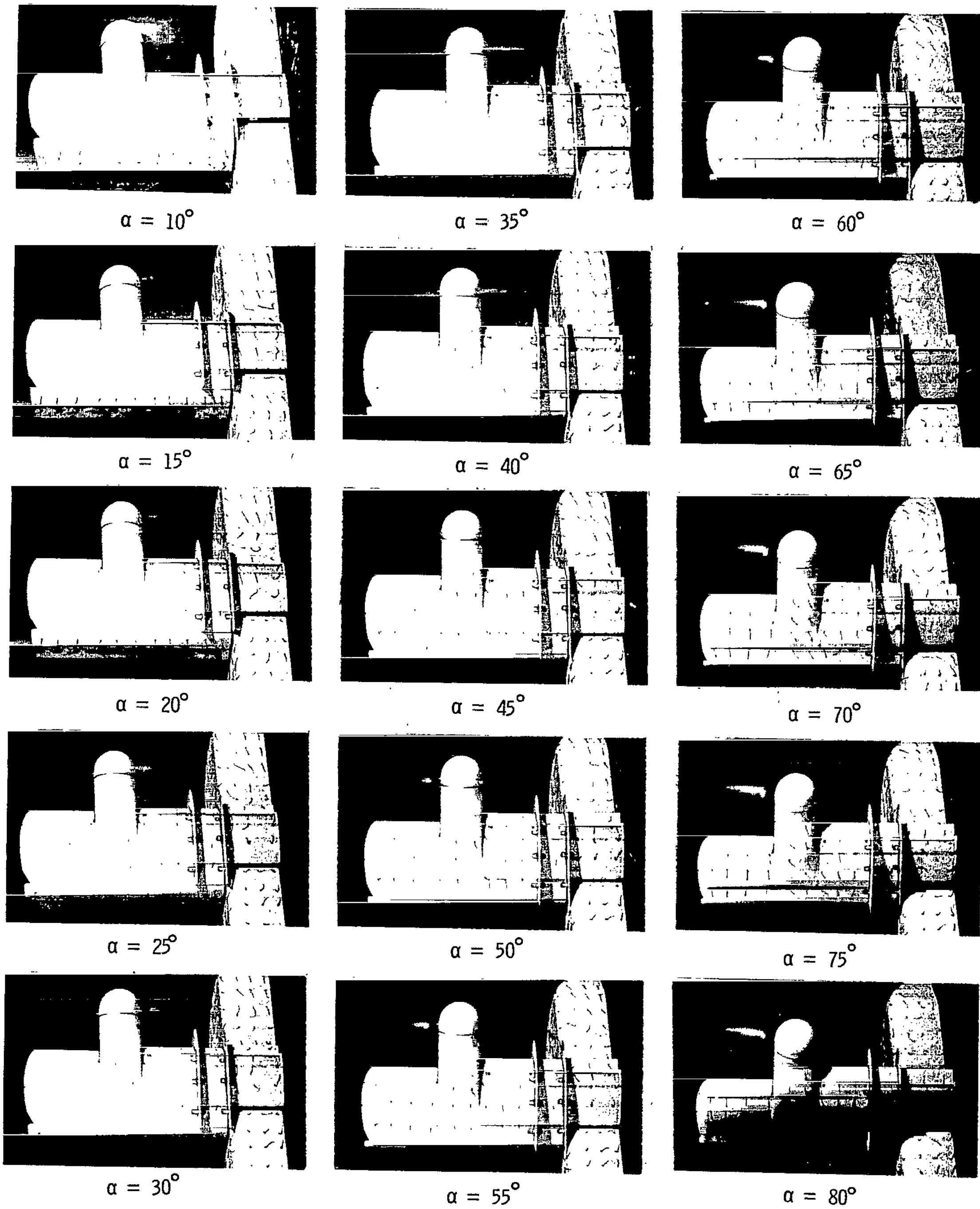
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 18.- Concluded.



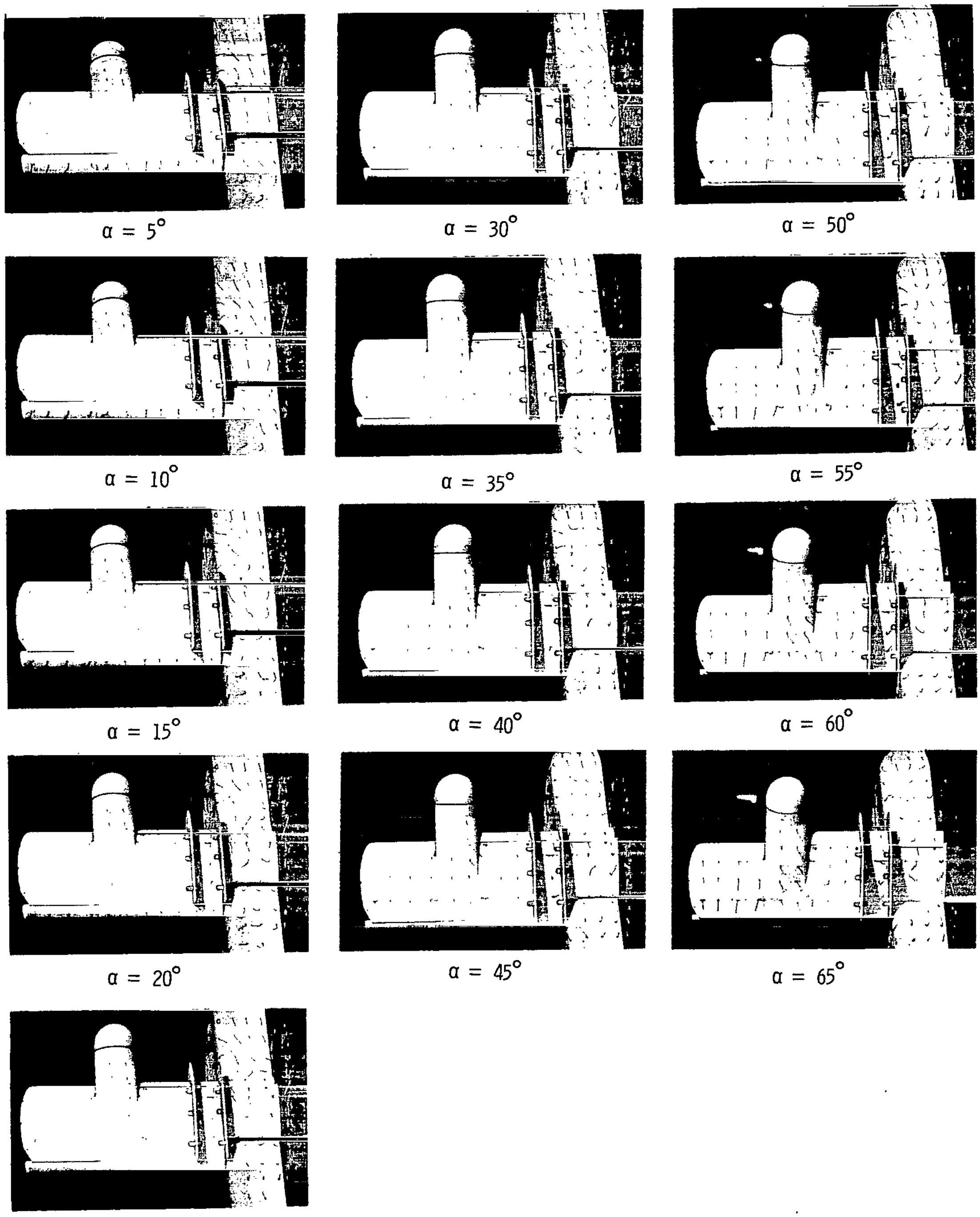
(a) Aerodynamic characteristics.

Figure 19.- Aerodynamic and flow characteristics of the wing with propeller rotation down at the tip. Inboard slat on; fences on; $\delta_f = 60^{\circ}$.



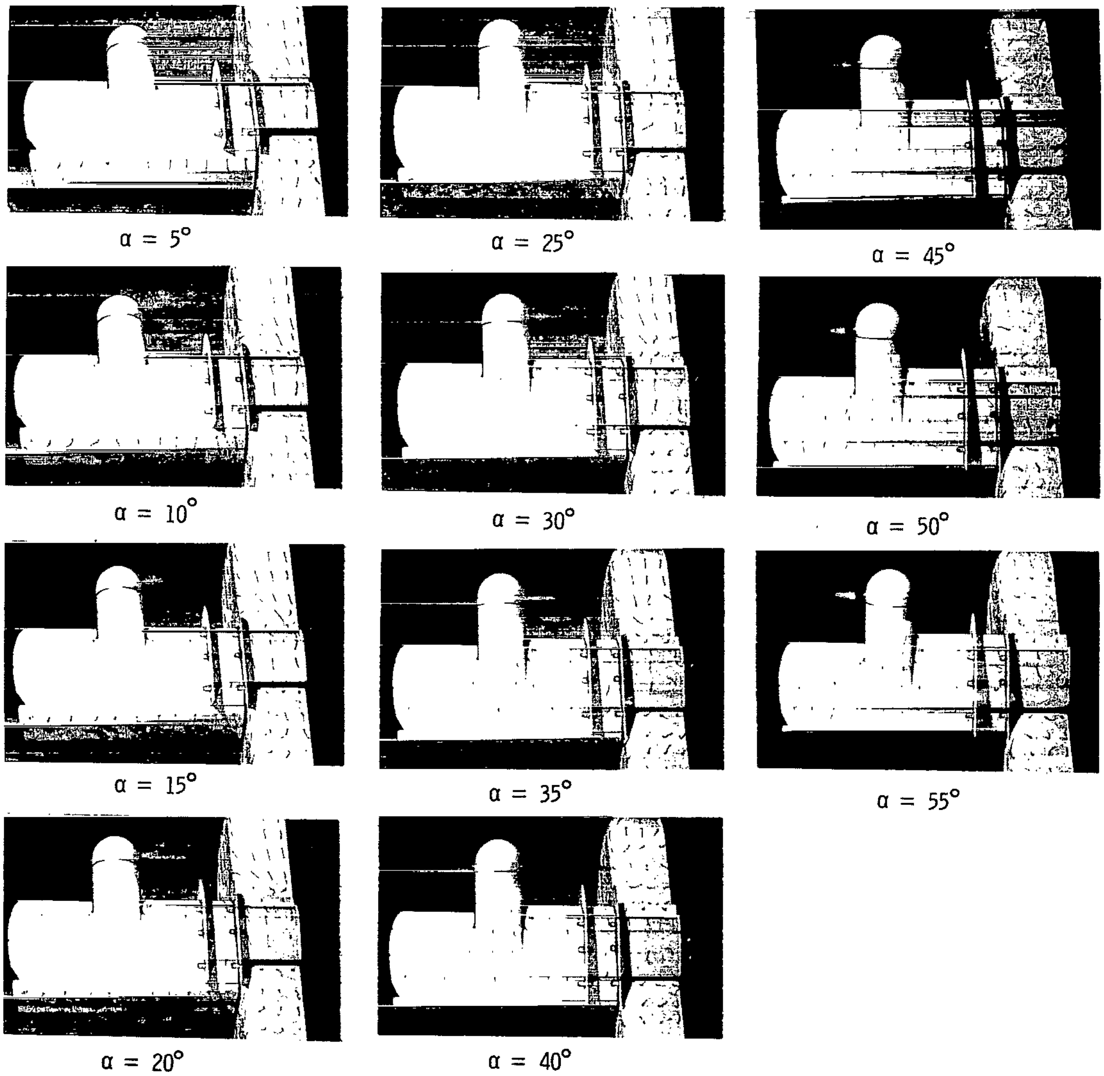
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 19.- Continued.



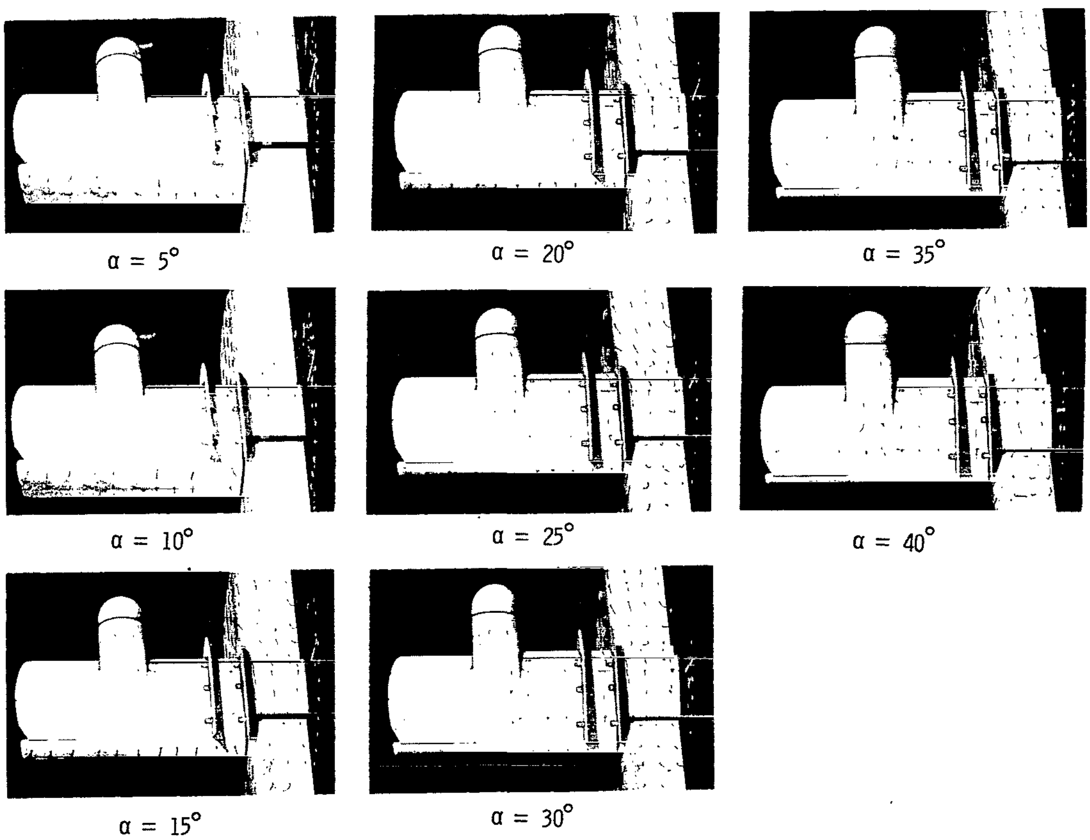
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 19.- Continued.



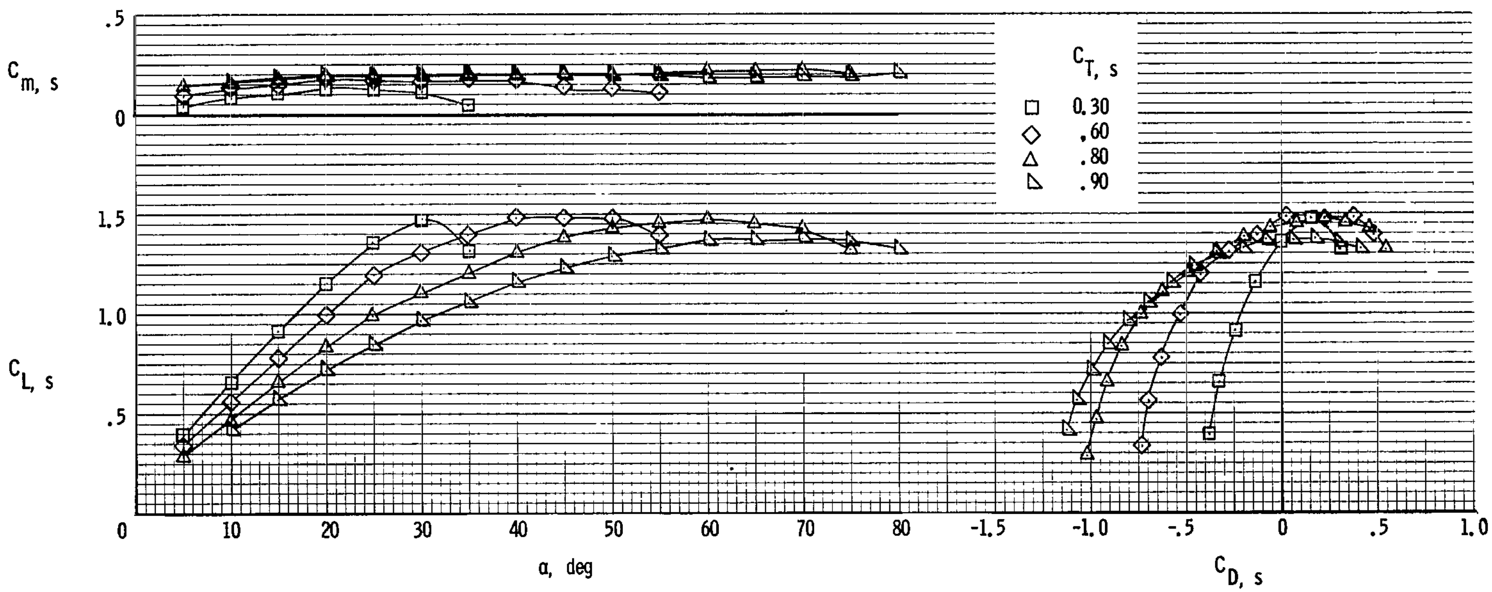
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 19.- Continued.



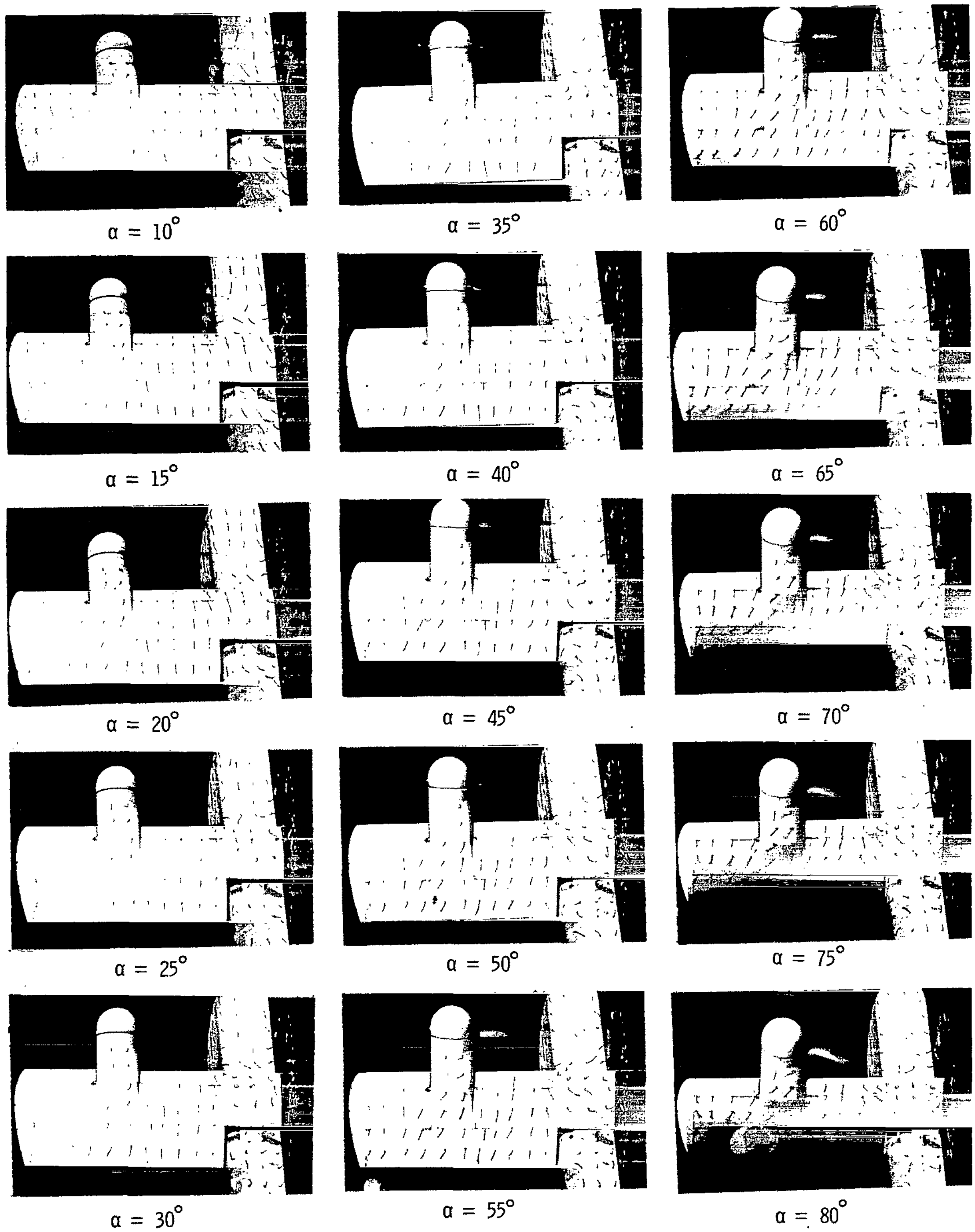
(e) Flow characteristics; $C_{T,S}$ = 0.30.

Figure 19.- Concluded.



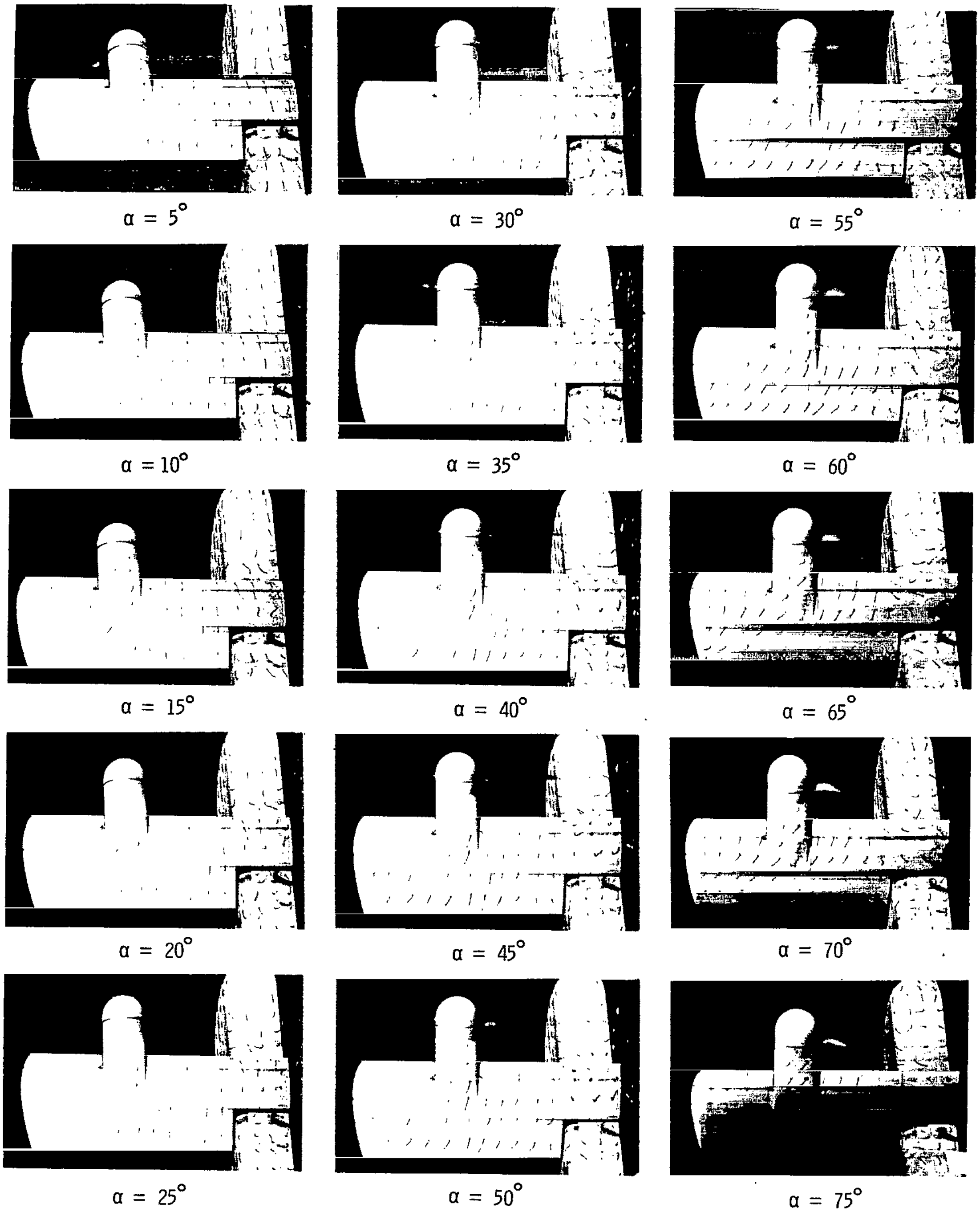
(a) Aerodynamic characteristics.

Figure 20.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Basic leading edge; $\delta_f = 0^0$.



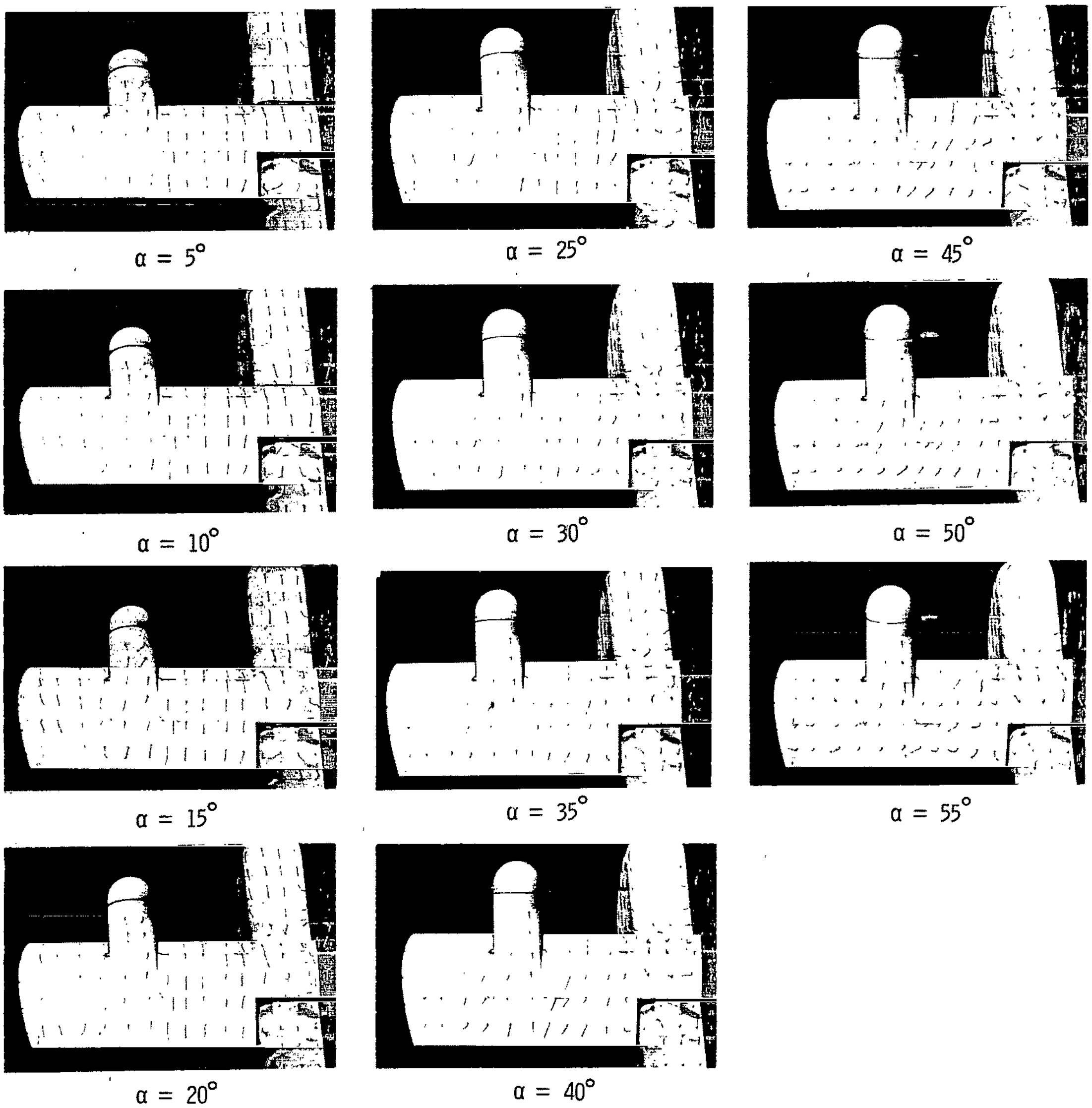
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 20.- Continued.



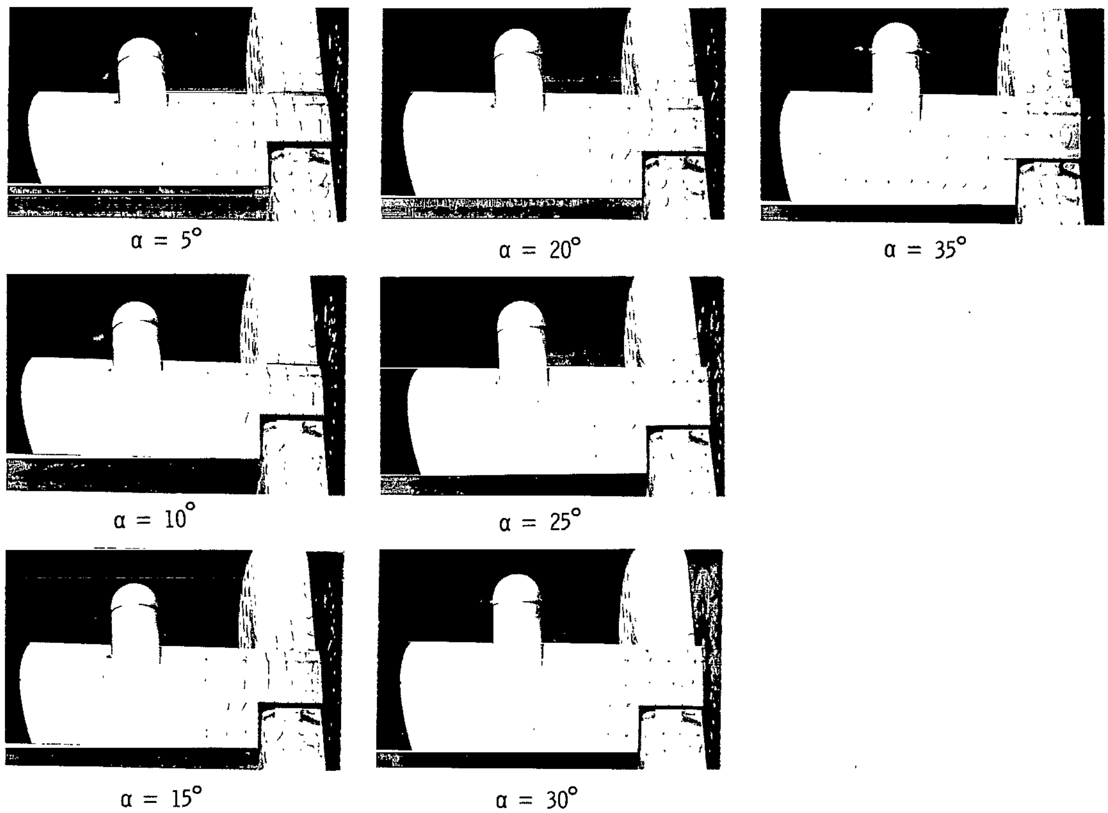
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 20.- Continued.



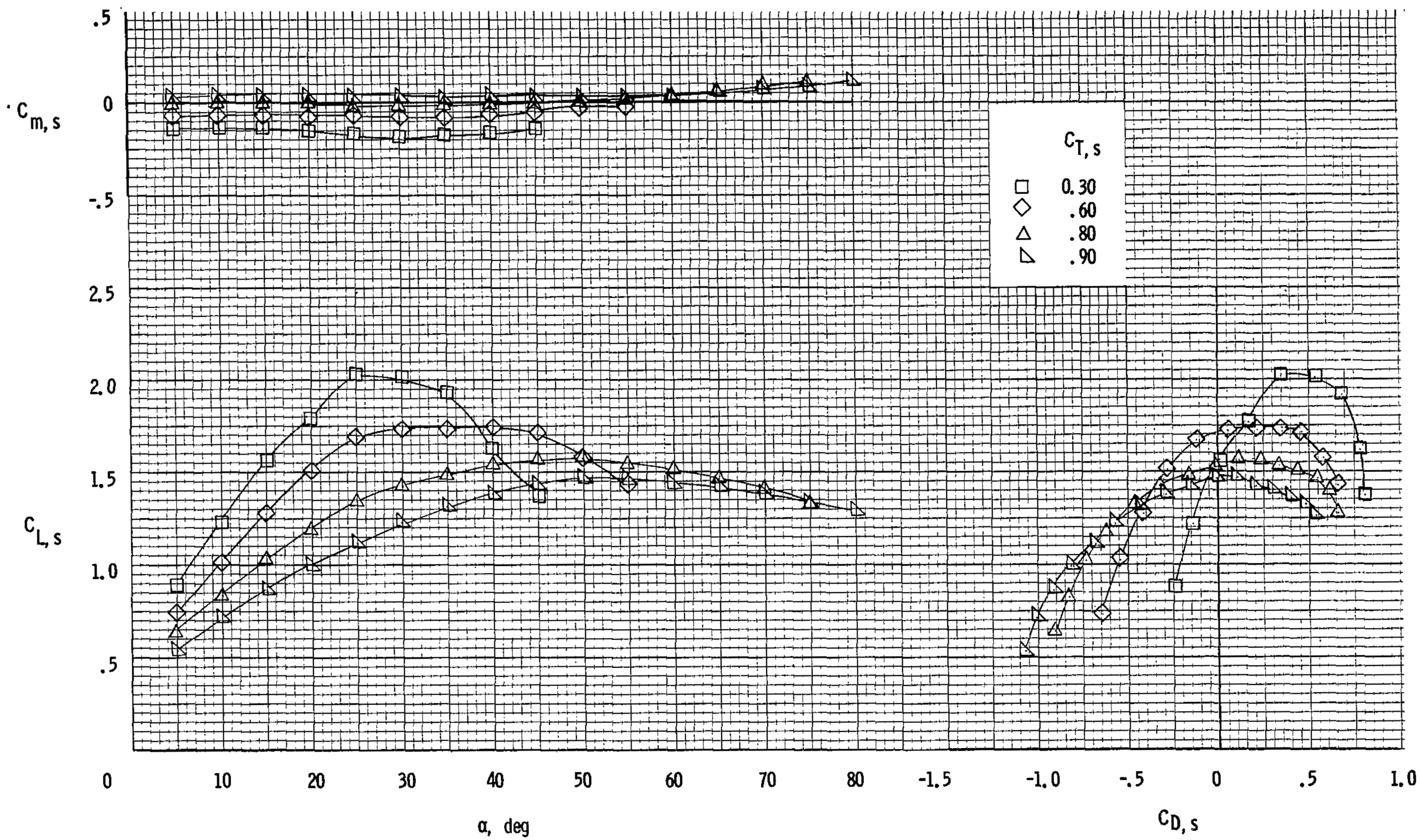
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 20.- Continued.



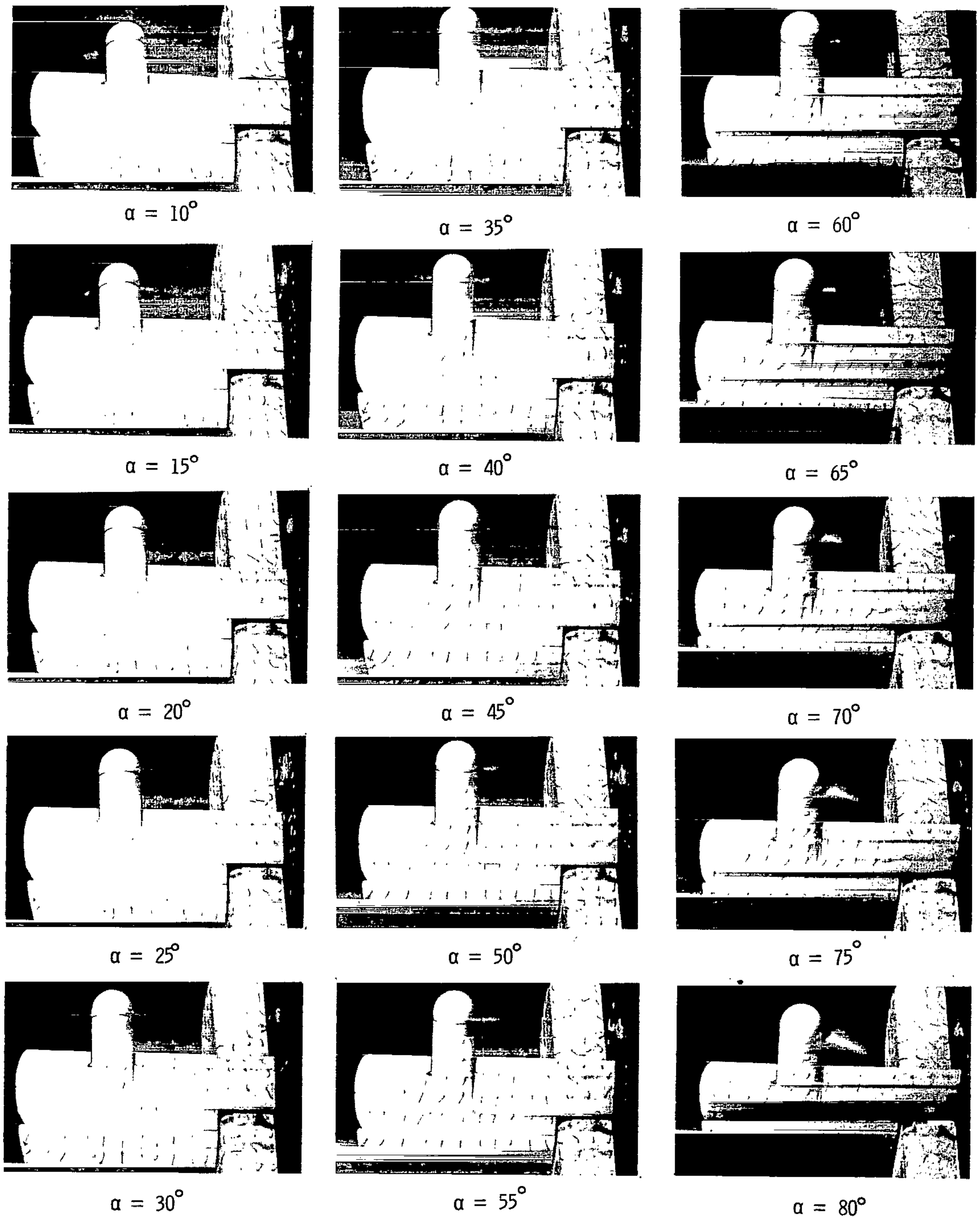
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 20.- Concluded.



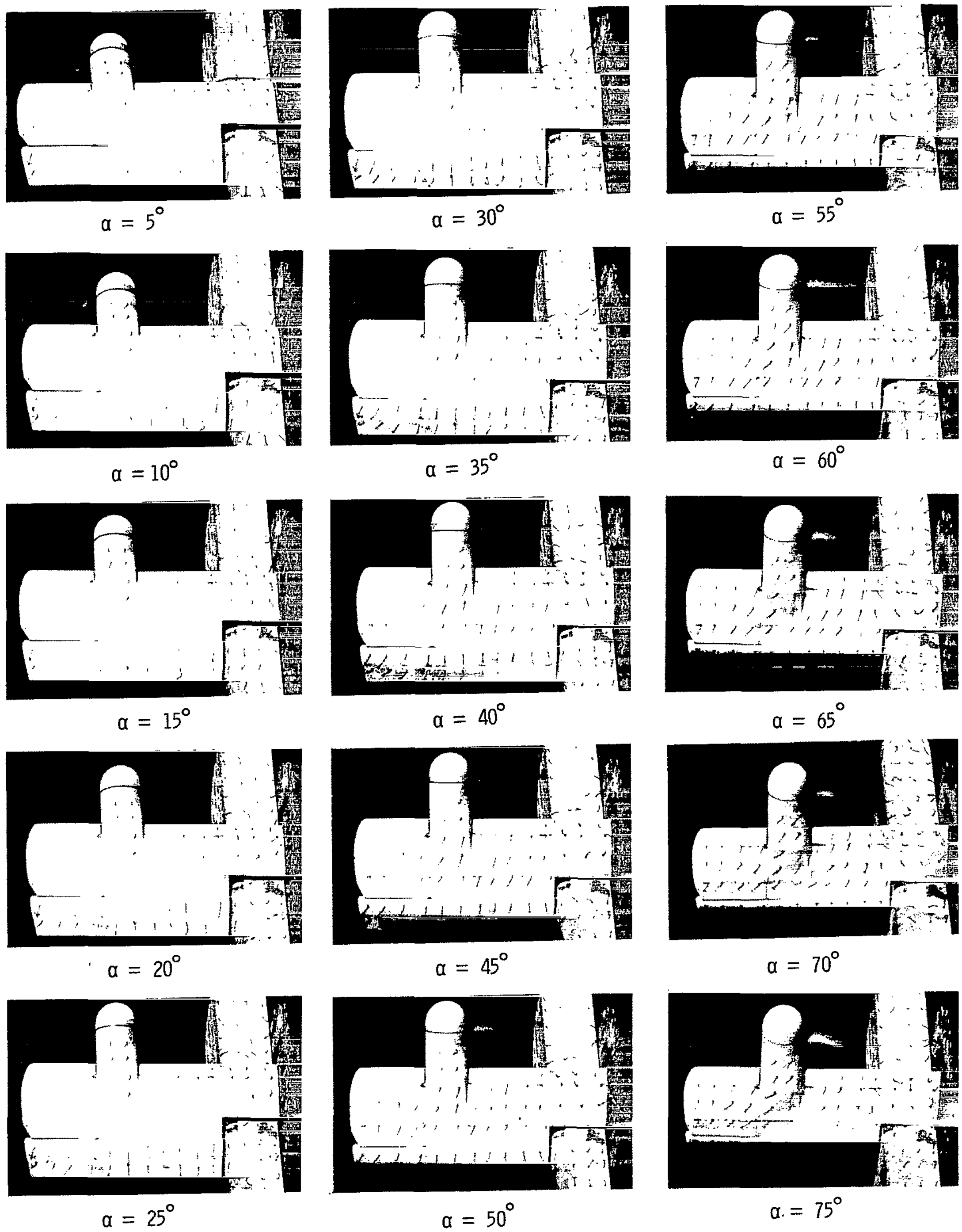
(a) Aerodynamic characteristics.

Figure 21.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Basic leading edge; $\delta_f = 20^o$.



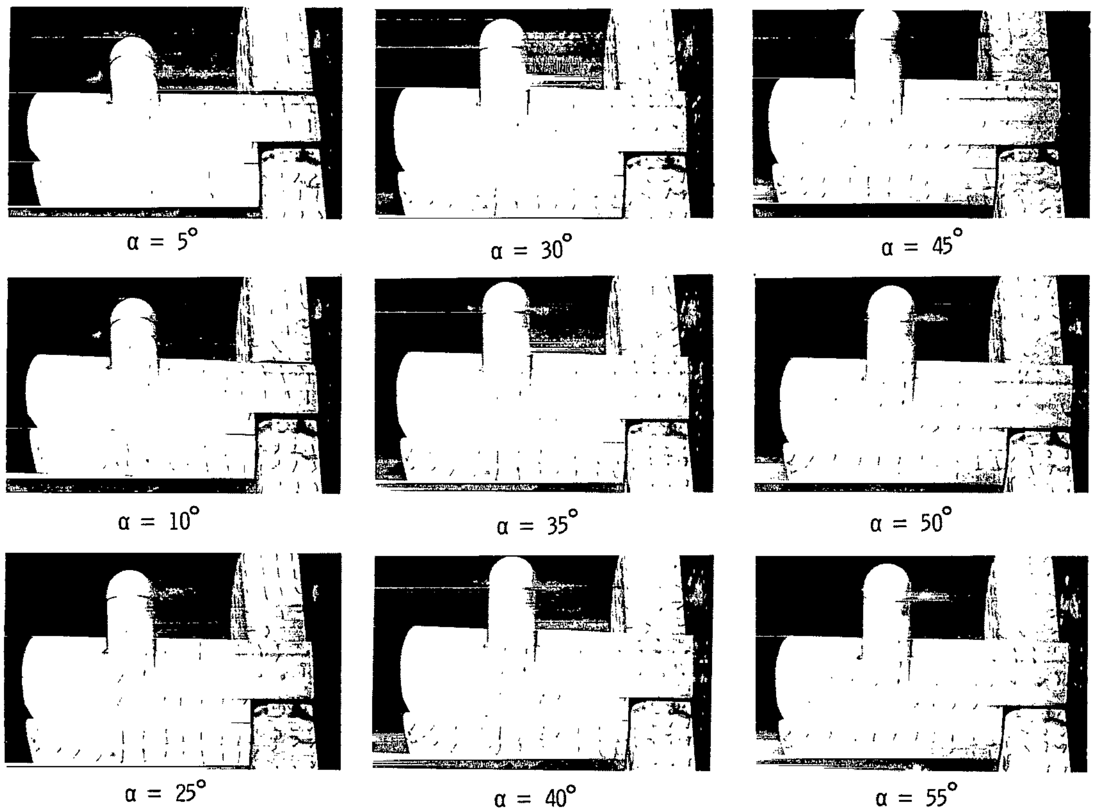
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 21.- Continued.



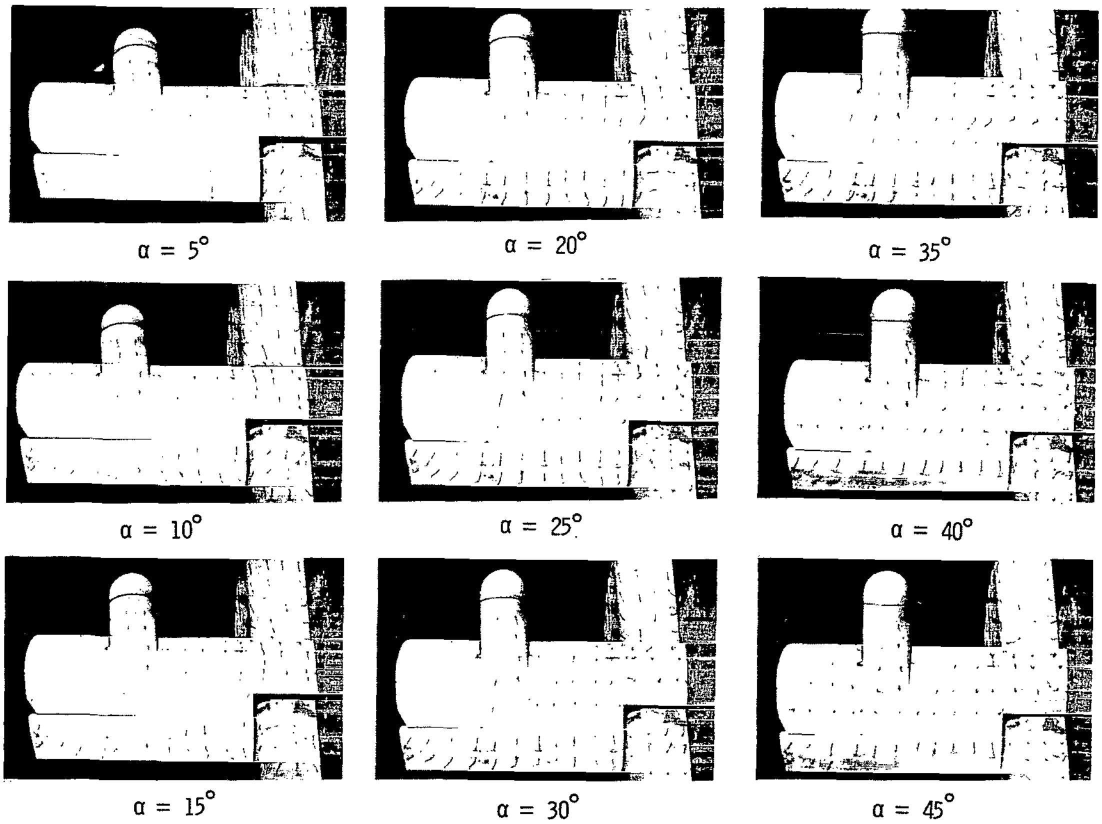
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 21.- Continued.



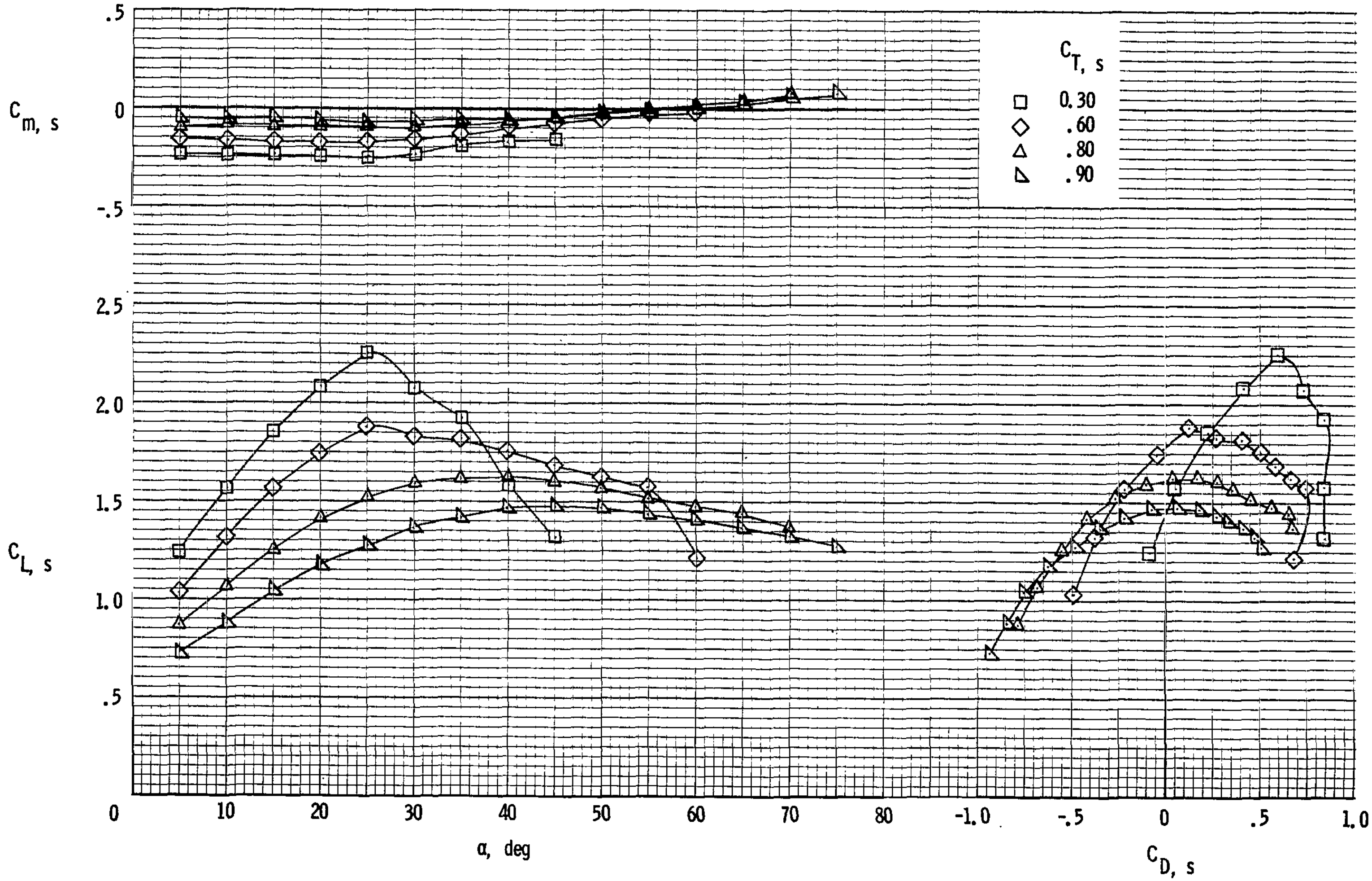
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 21.- Continued.



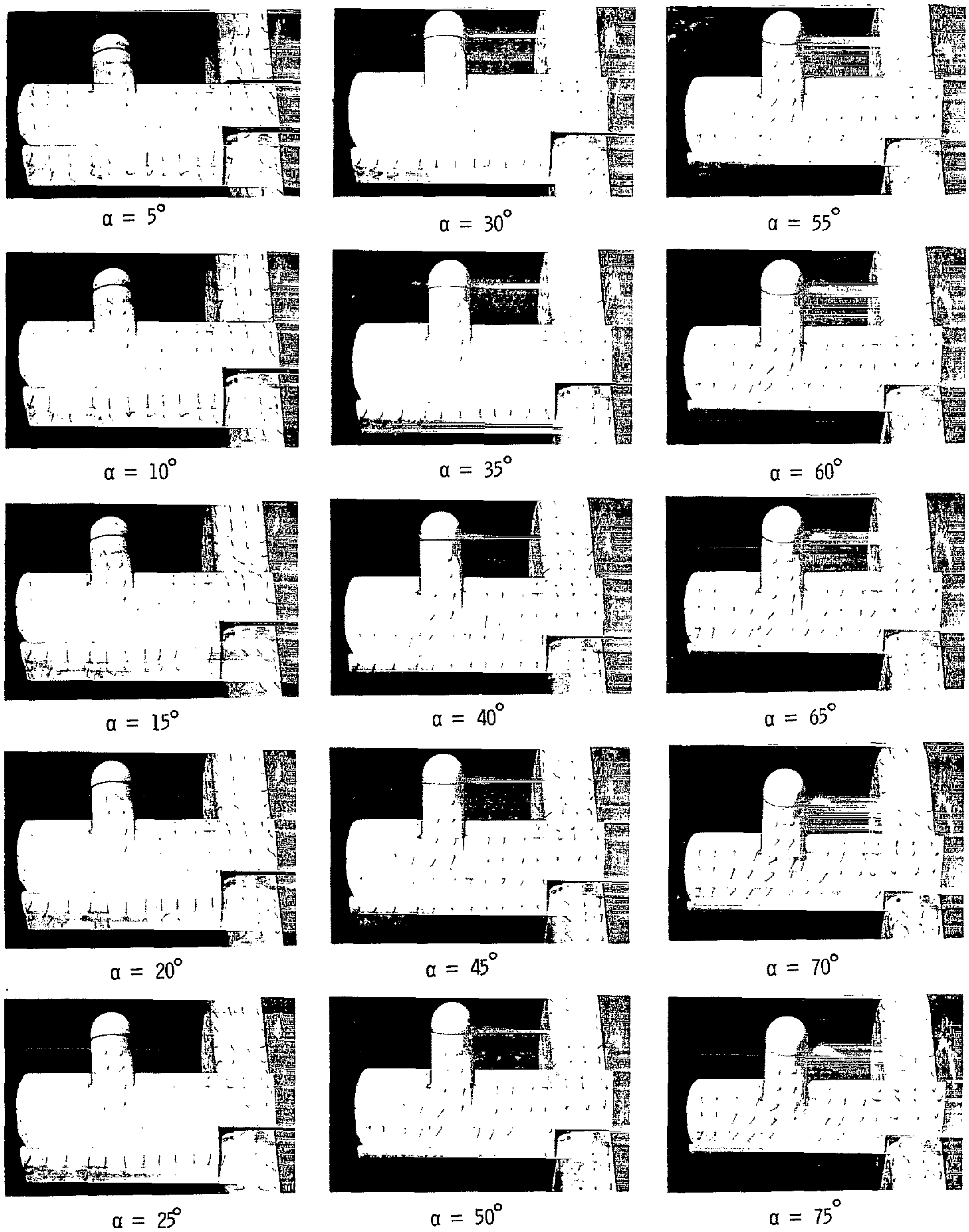
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 21.- Concluded.



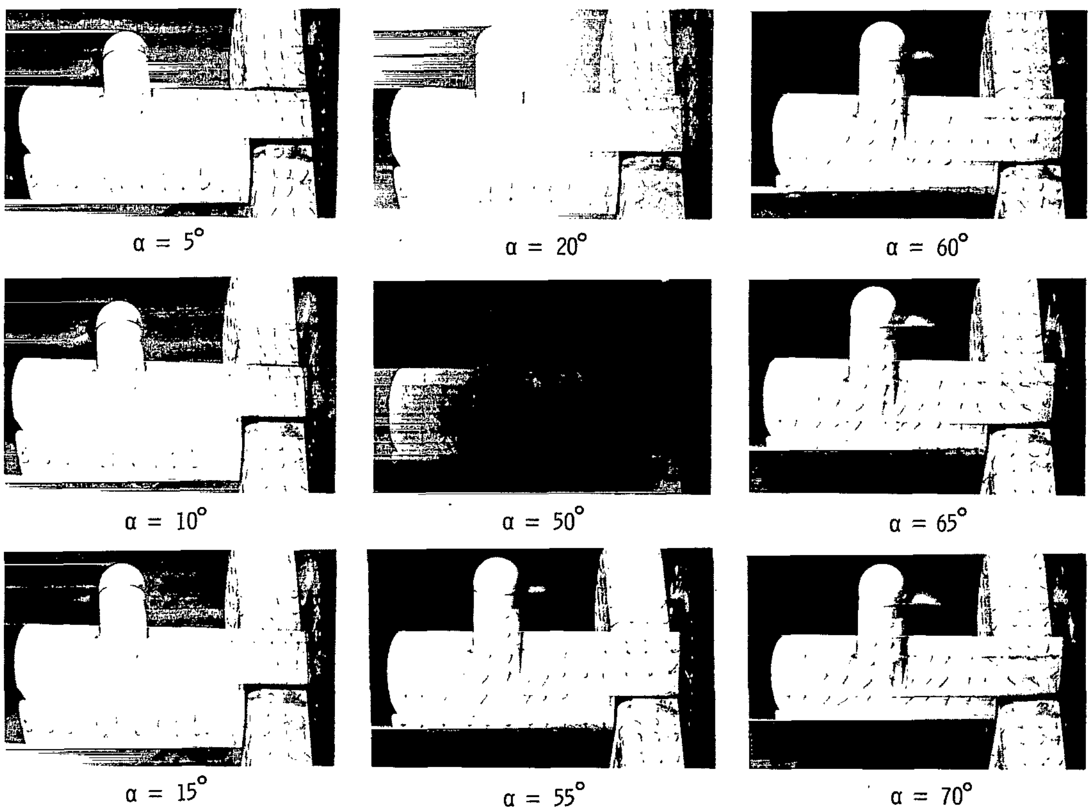
(a) Aerodynamic characteristics.

Figure 22.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Basic leading edge; $\delta_f = 40^{\circ}$.



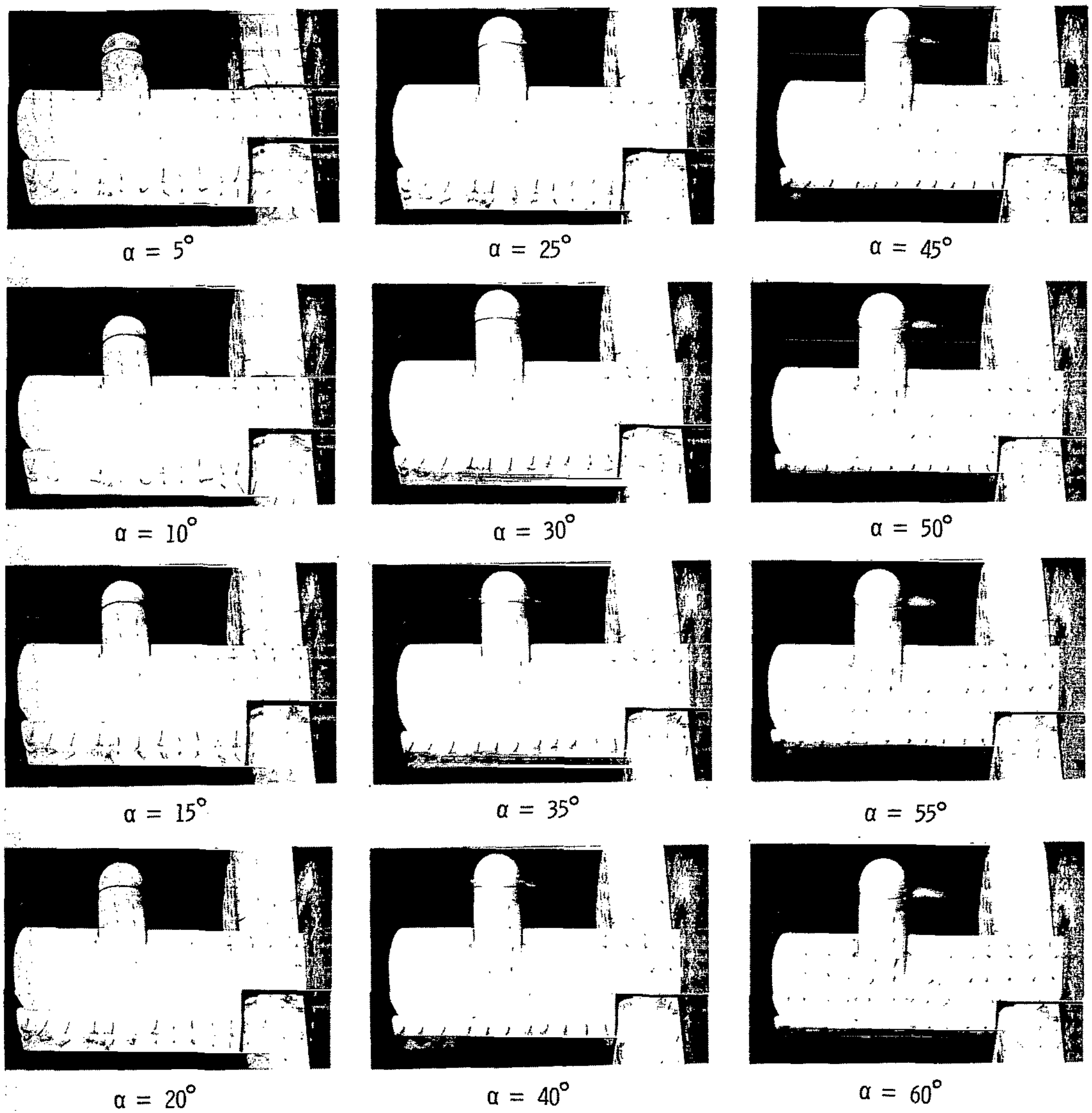
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 22.- Continued.



(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 22.- Continued.



$\alpha = 5^\circ$ $\alpha = 25^\circ$ $\alpha = 45^\circ$

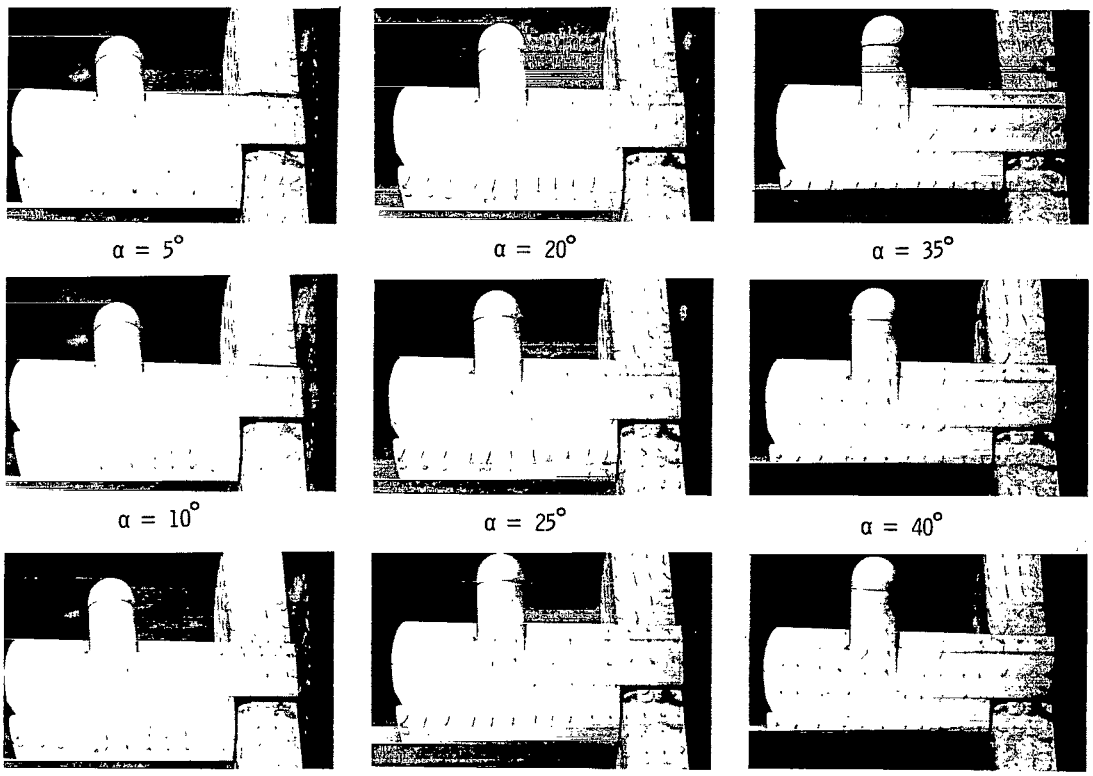
$\alpha = 10^\circ$ $\alpha = 30^\circ$ $\alpha = 50^\circ$

$\alpha = 15^\circ$ $\alpha = 35^\circ$ $\alpha = 55^\circ$

$\alpha = 20^\circ$ $\alpha = 40^\circ$ $\alpha = 60^\circ$

(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 22.- Continued.



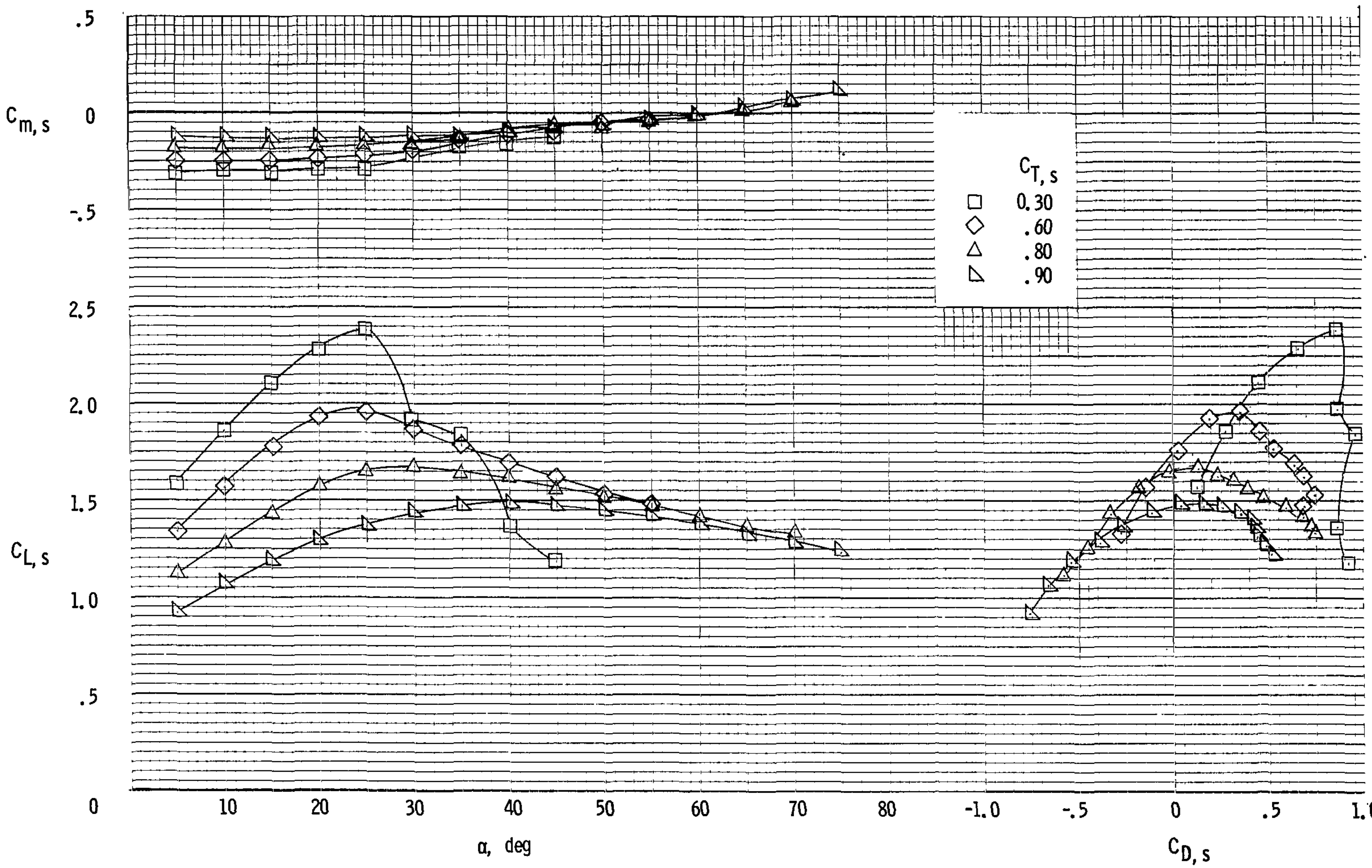
$\alpha = 5^\circ$ $\alpha = 20^\circ$ $\alpha = 35^\circ$

$\alpha = 10^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

$\alpha = 15^\circ$ $\alpha = 30^\circ$ $\alpha = 45^\circ$

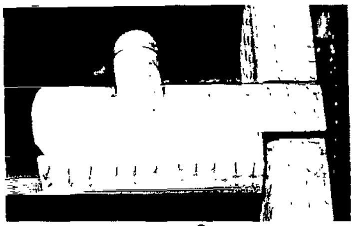
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 22.- Concluded.

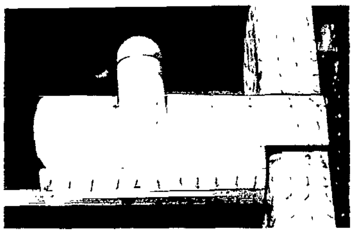


(a) Aerodynamic characteristics.

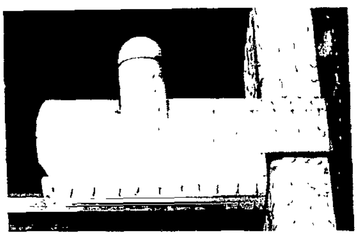
Figure 23.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Basic leading edge; $\delta_f = 60^{\circ}$.



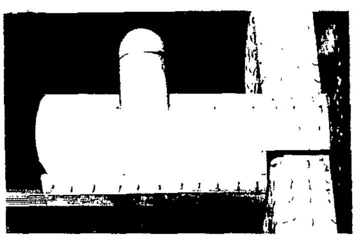
α = 5°



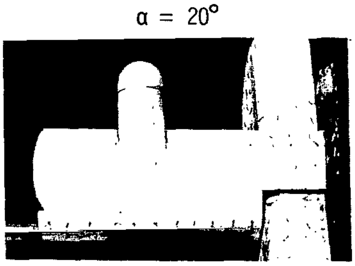
α = 10°



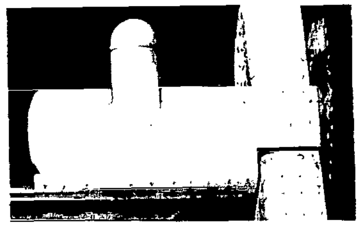
α = 15°



α = 20°



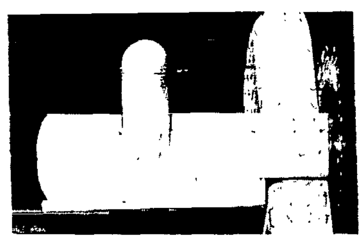
α = 25°



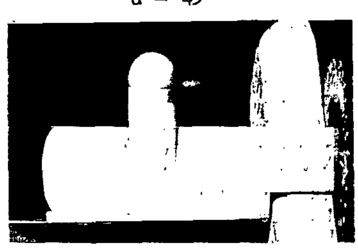
α = 30°

α = 35°

α = 40°

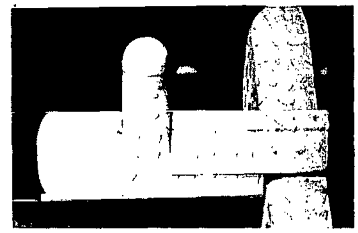


α = 45°

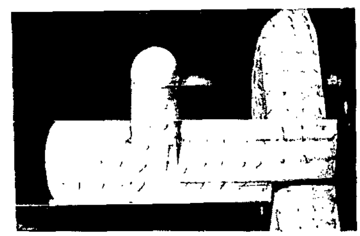


α = 50°

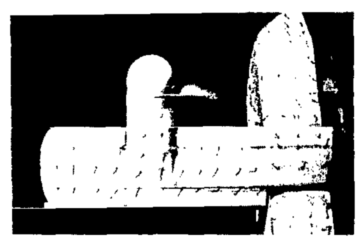
α = 55°



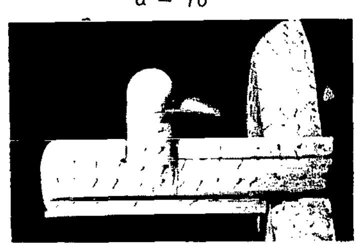
α = 60°



α = 65°



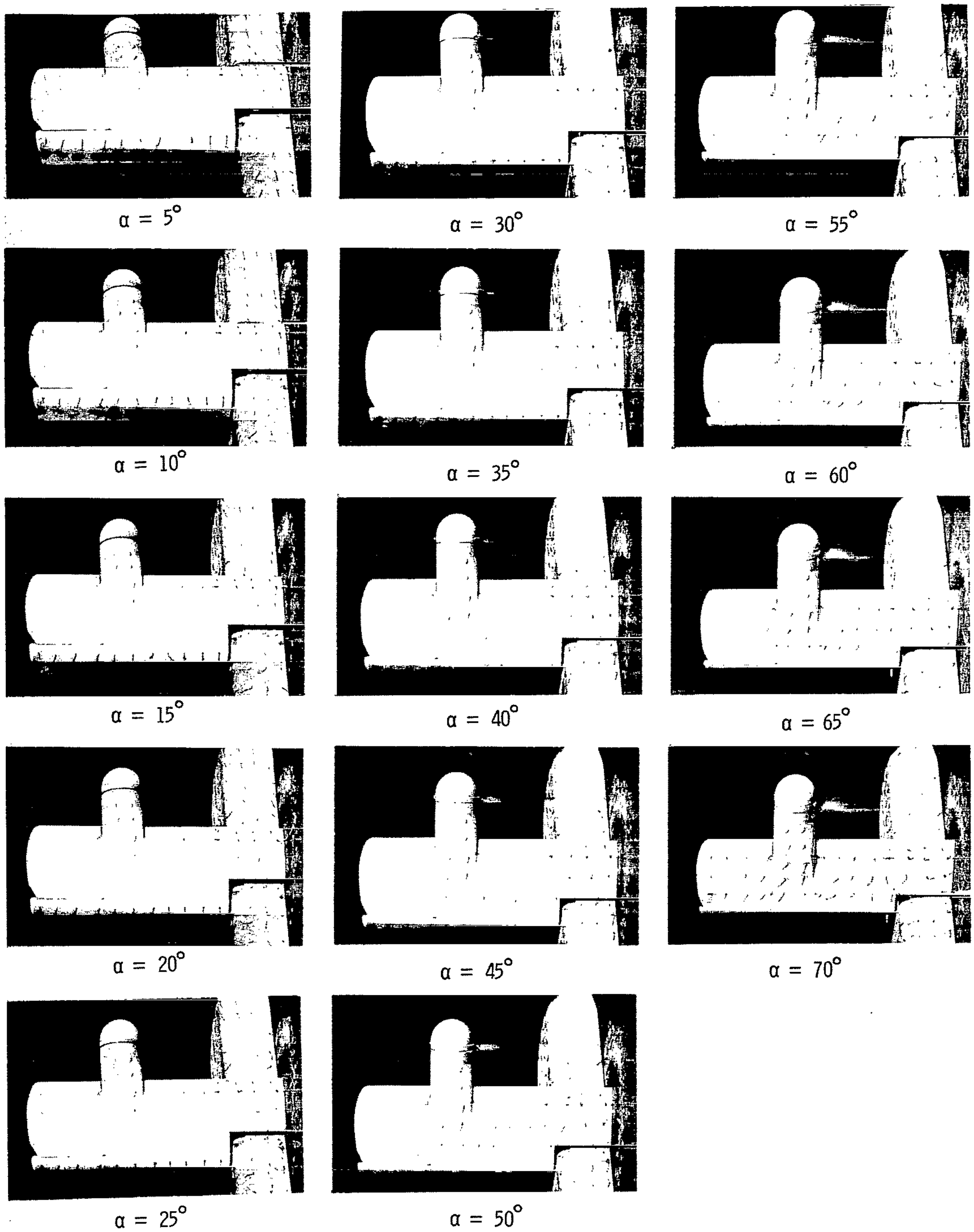
α = 70°



α = 75°

(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 23.- Continued.



$\alpha = 5^\circ$ $\alpha = 30^\circ$ $\alpha = 55^\circ$

$\alpha = 10^\circ$ $\alpha = 35^\circ$ $\alpha = 60^\circ$

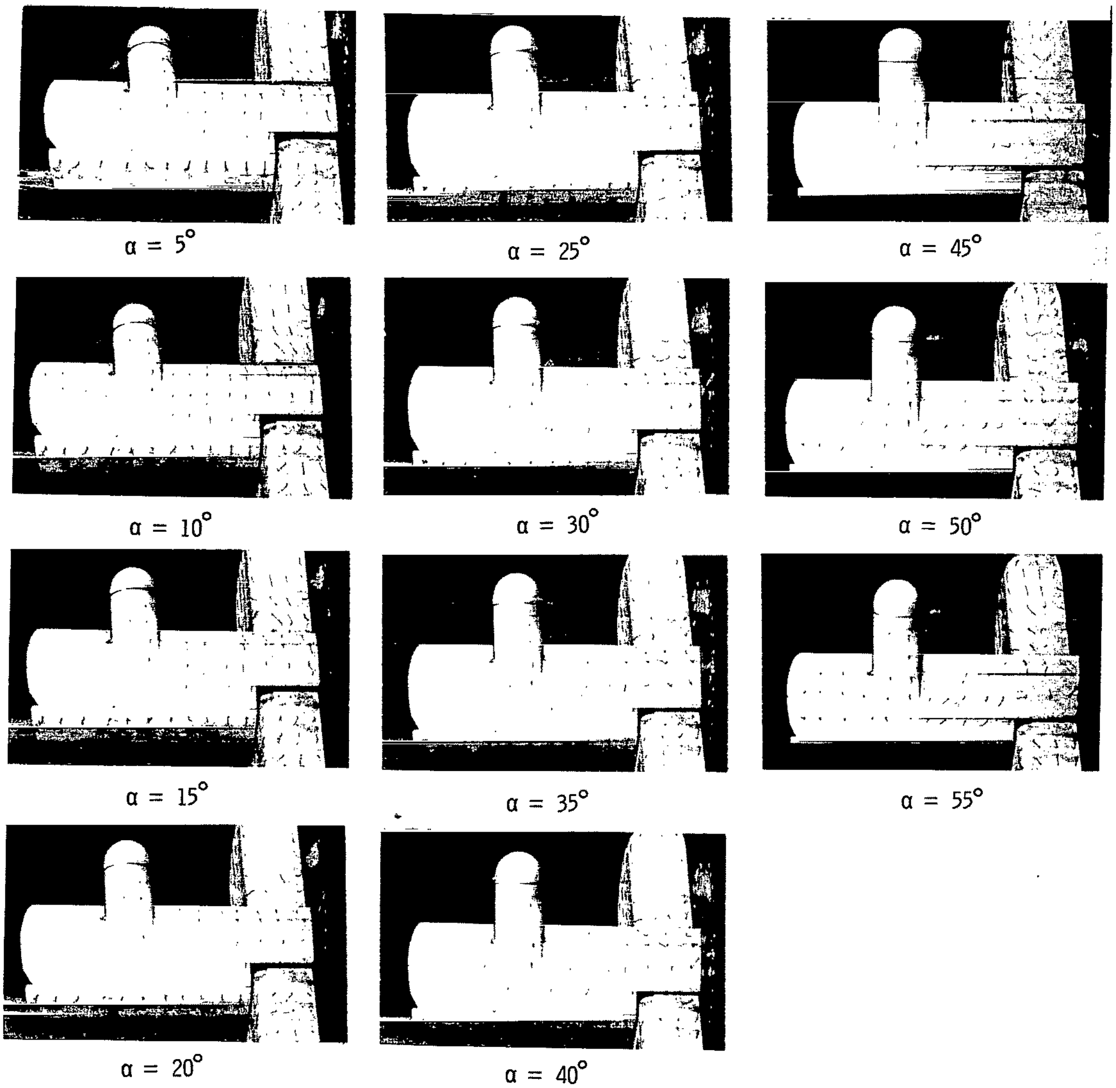
$\alpha = 15^\circ$ $\alpha = 40^\circ$ $\alpha = 65^\circ$

$\alpha = 20^\circ$ $\alpha = 45^\circ$ $\alpha = 70^\circ$

$\alpha = 25^\circ$ $\alpha = 50^\circ$

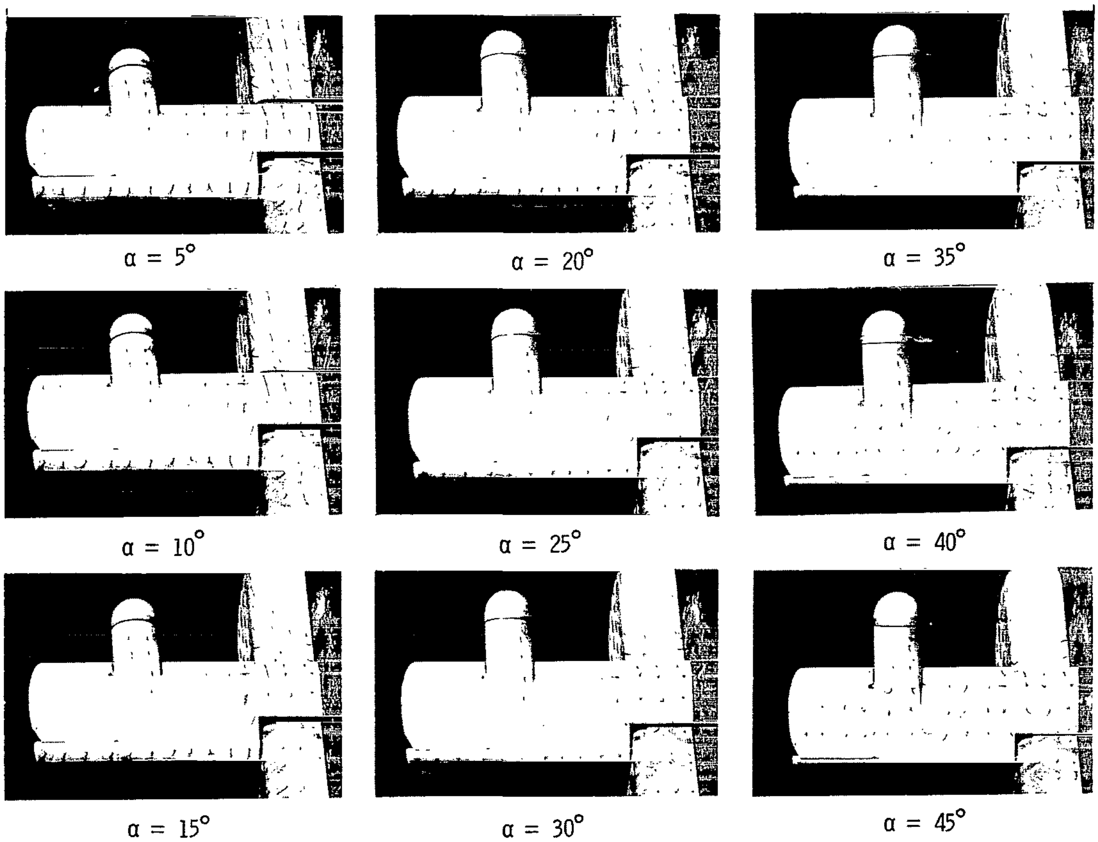
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 23.- Continued.



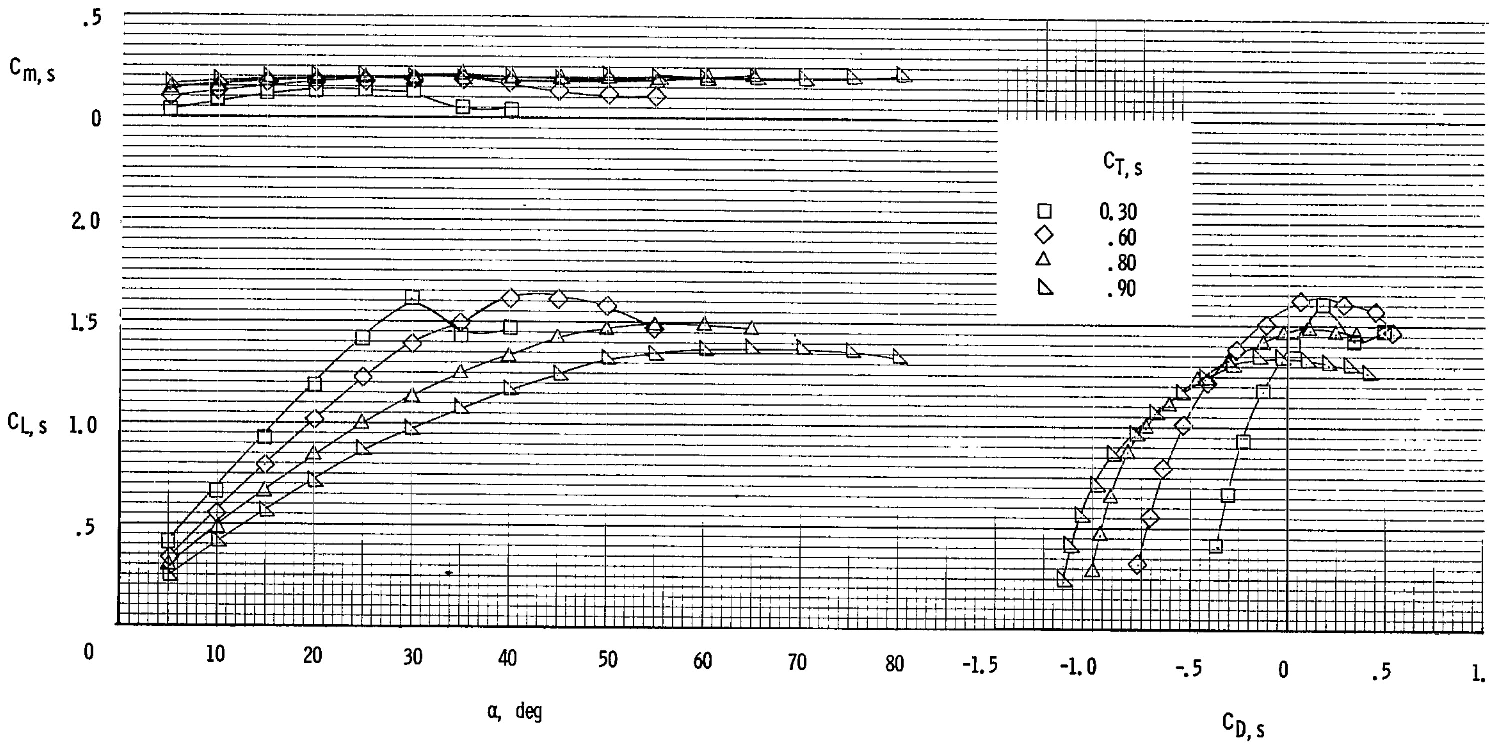
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 23.- Continued.



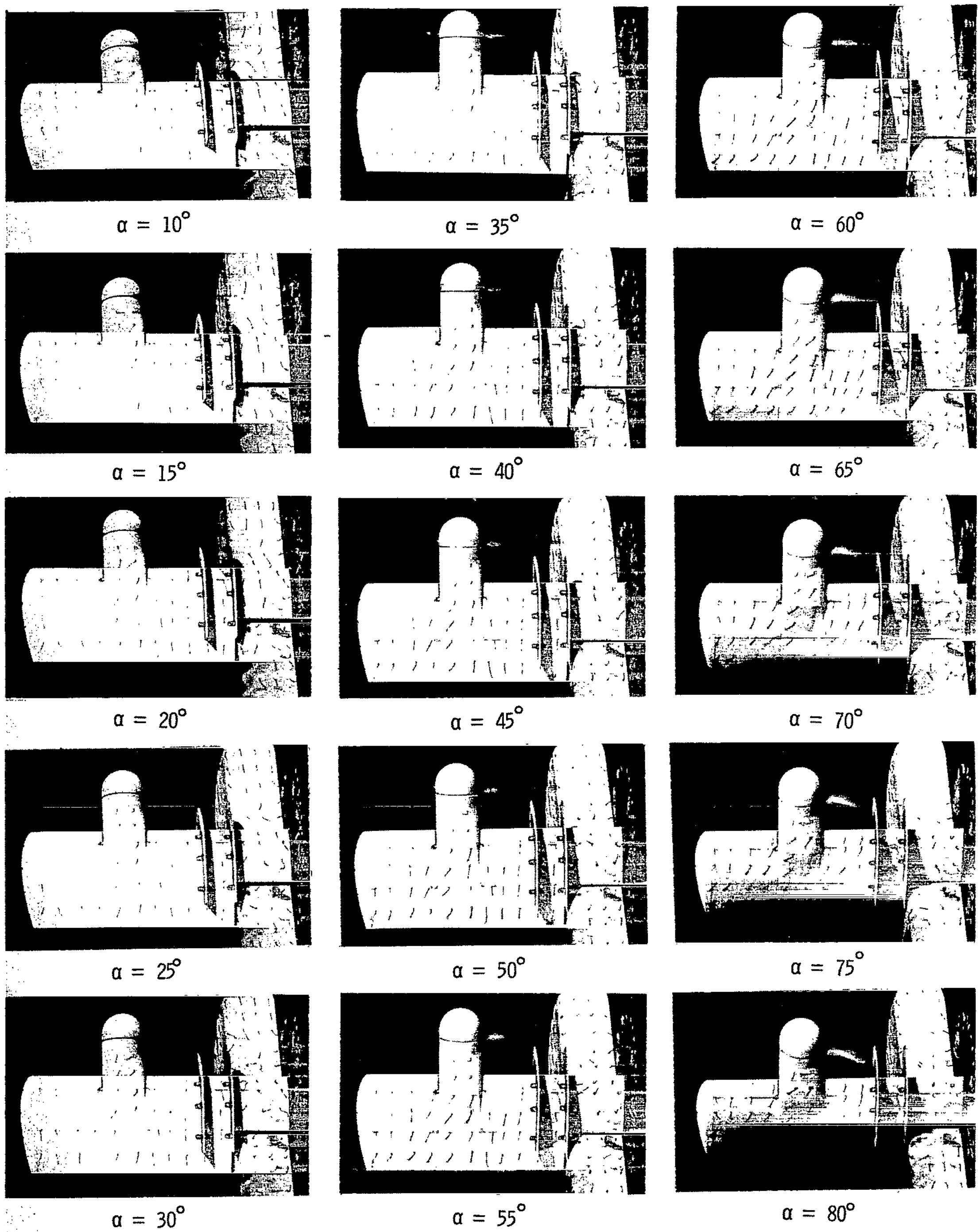
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 23.- Concluded.



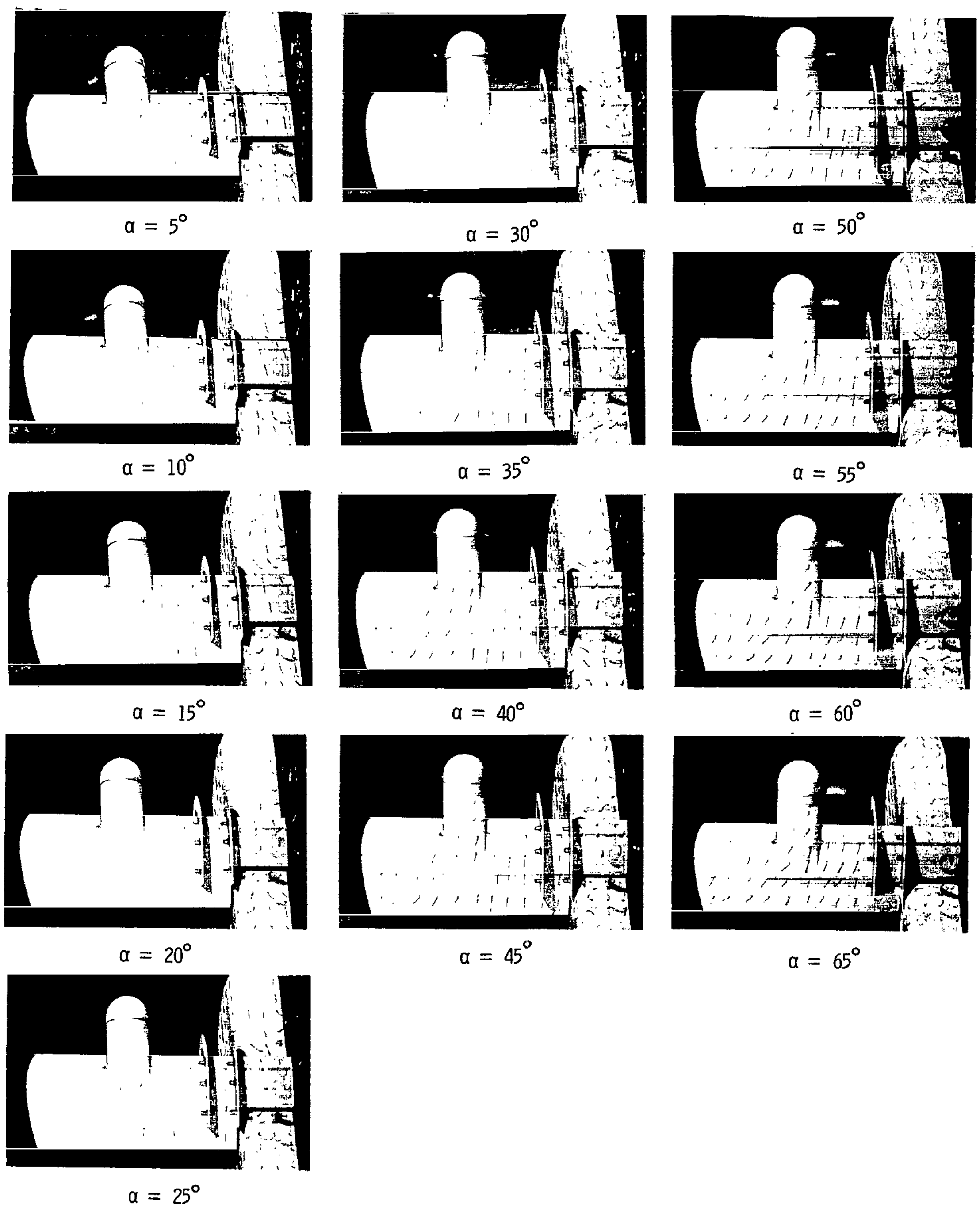
(a) Aerodynamic characteristics.

Figure 24.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Fences on; $\delta_f = 0^0$.



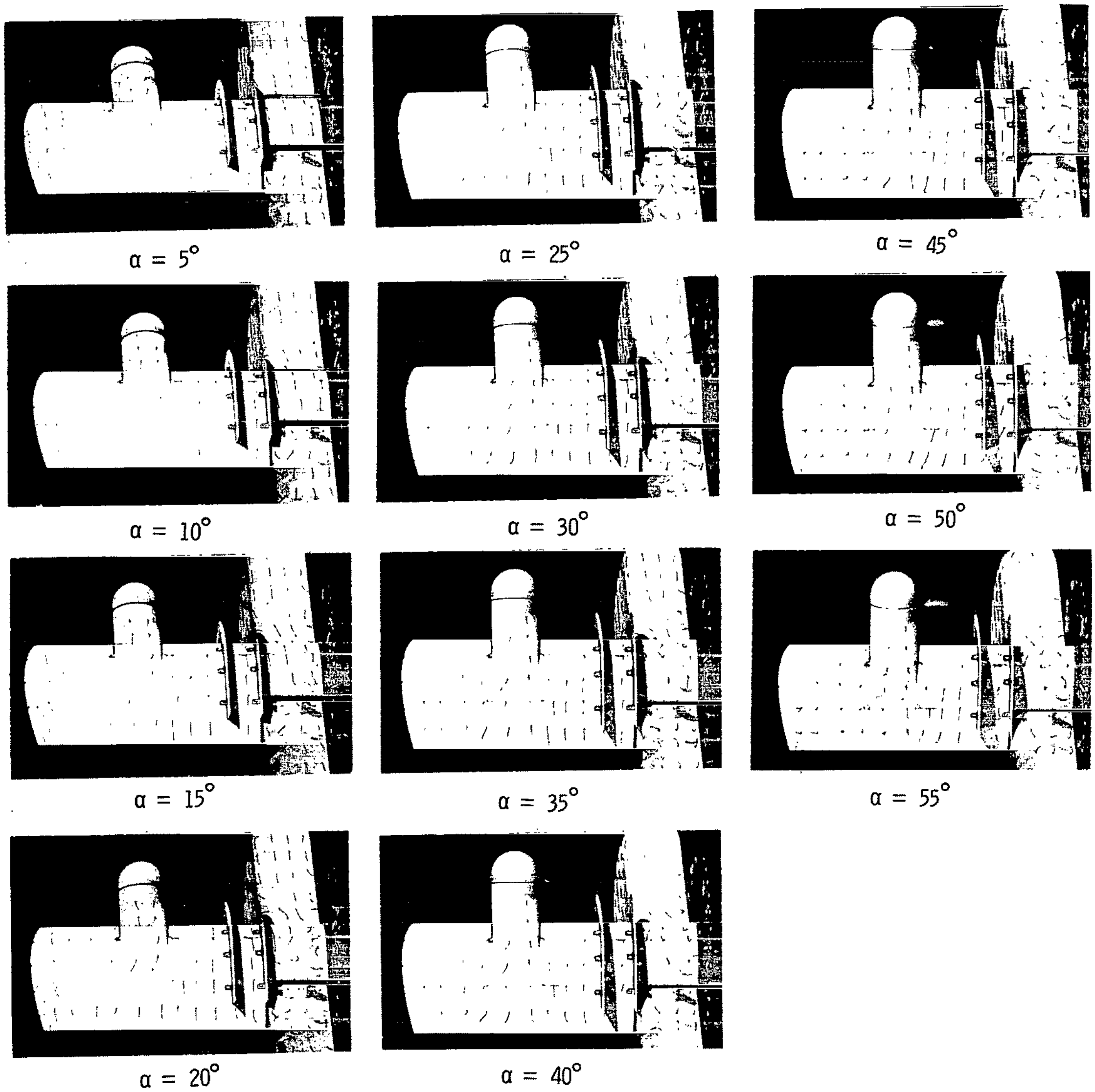
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 24.- Continued.



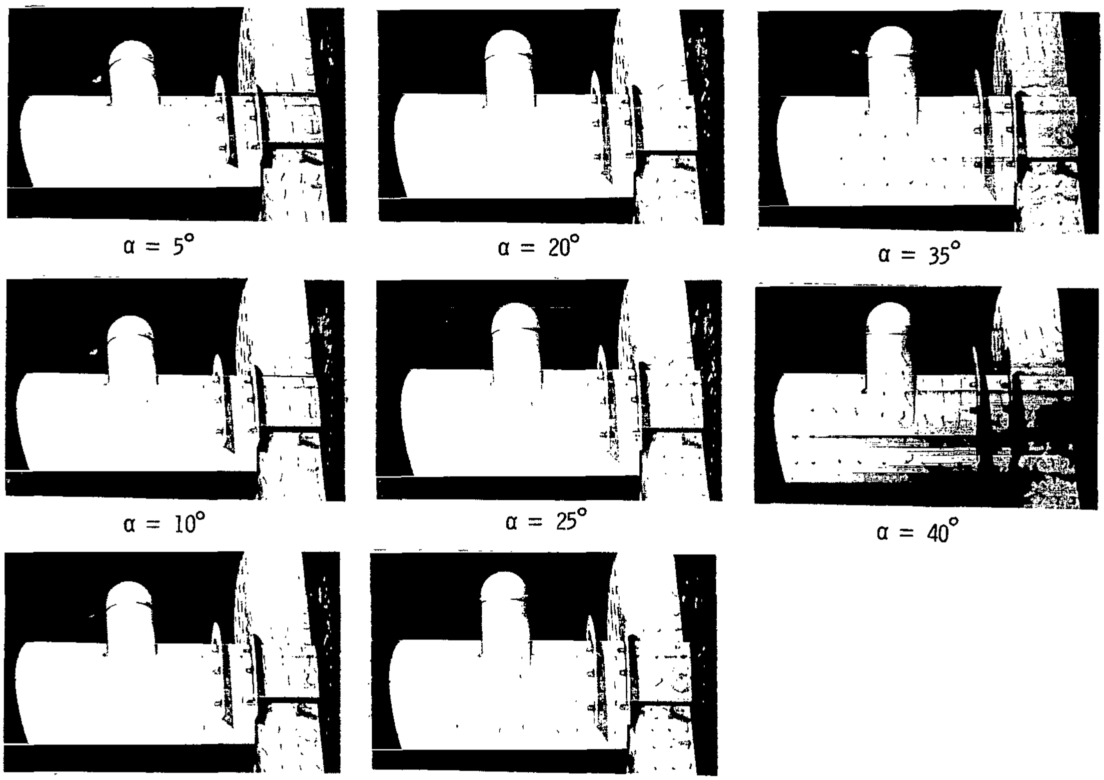
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 24.- Continued.



(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 24.- Continued.



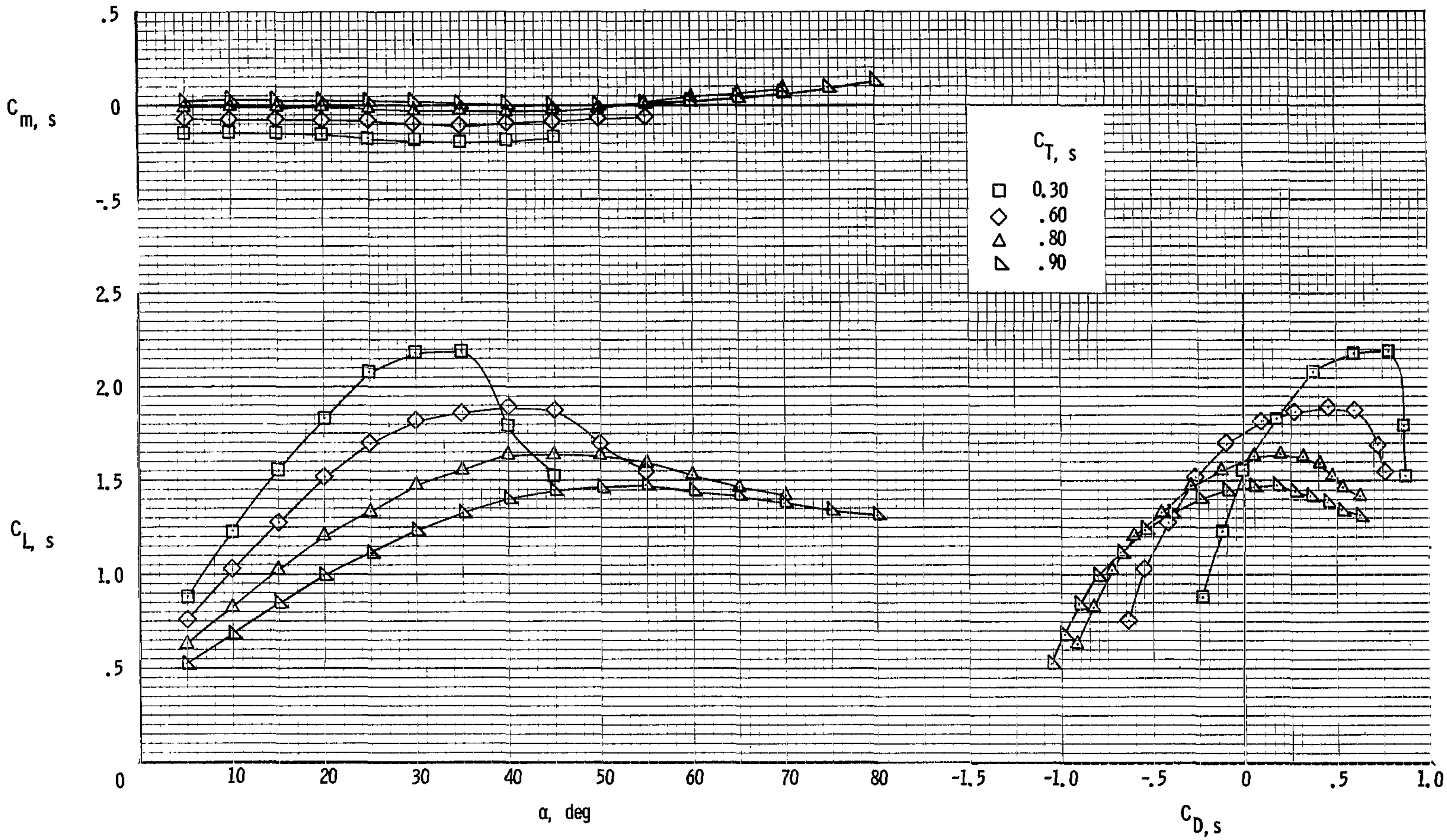
$\alpha = 5^\circ$ $\alpha = 20^\circ$ $\alpha = 35^\circ$

$\alpha = 10^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

$\alpha = 15^\circ$ $\alpha = 30^\circ$

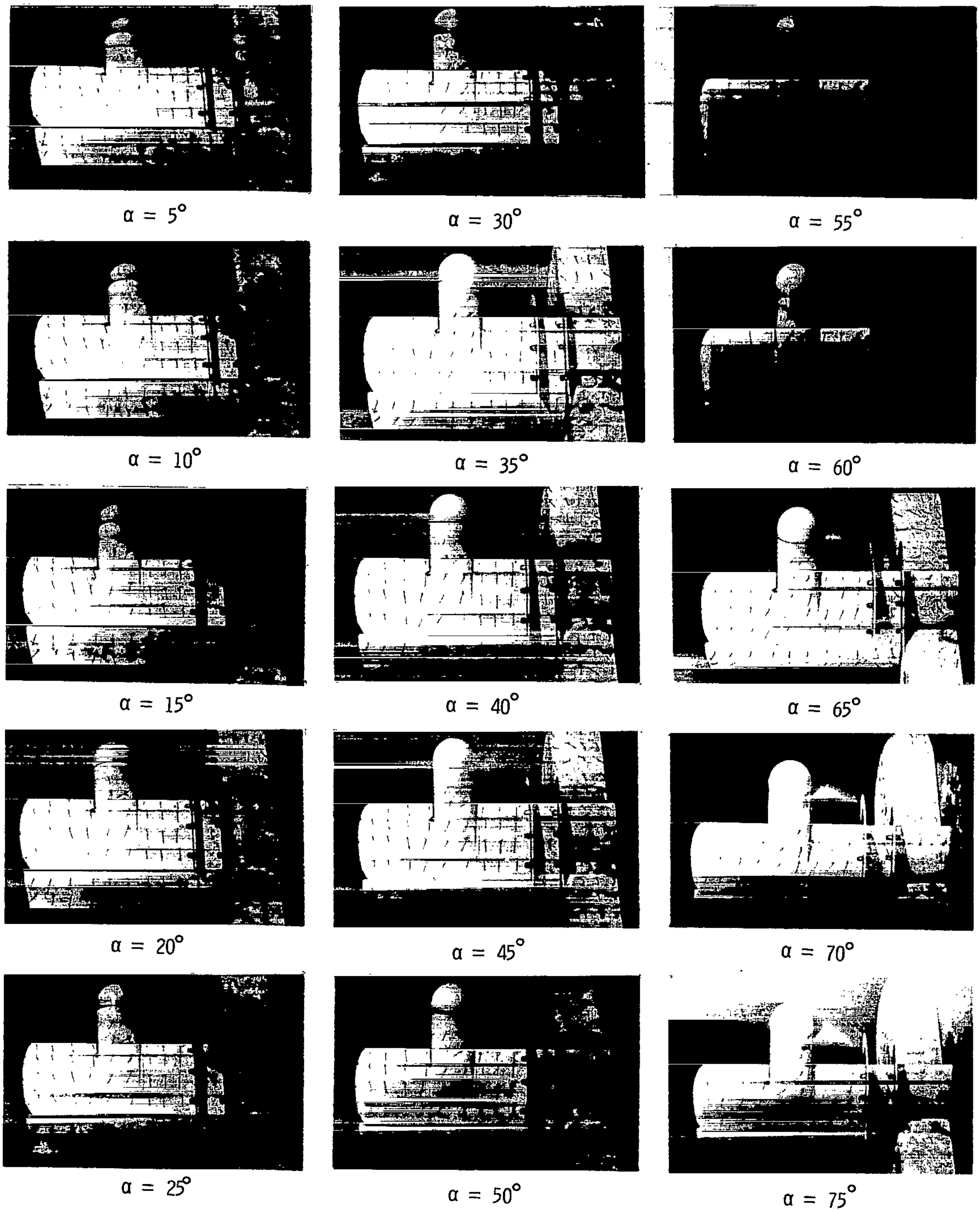
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 24.- Concluded.



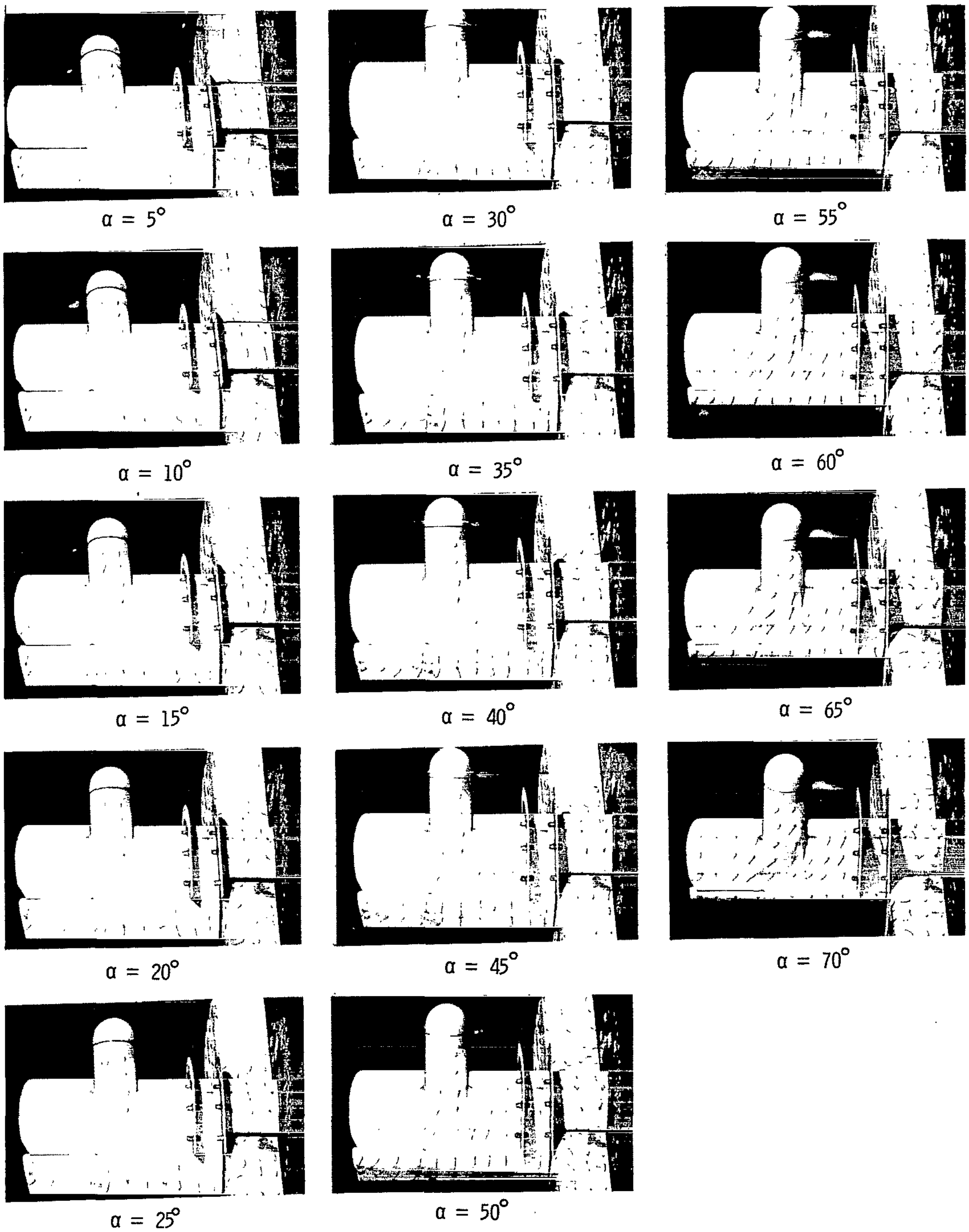
(a) Aerodynamic characteristics.

Figure 25.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Fences on; $\delta_f = 20^0$.



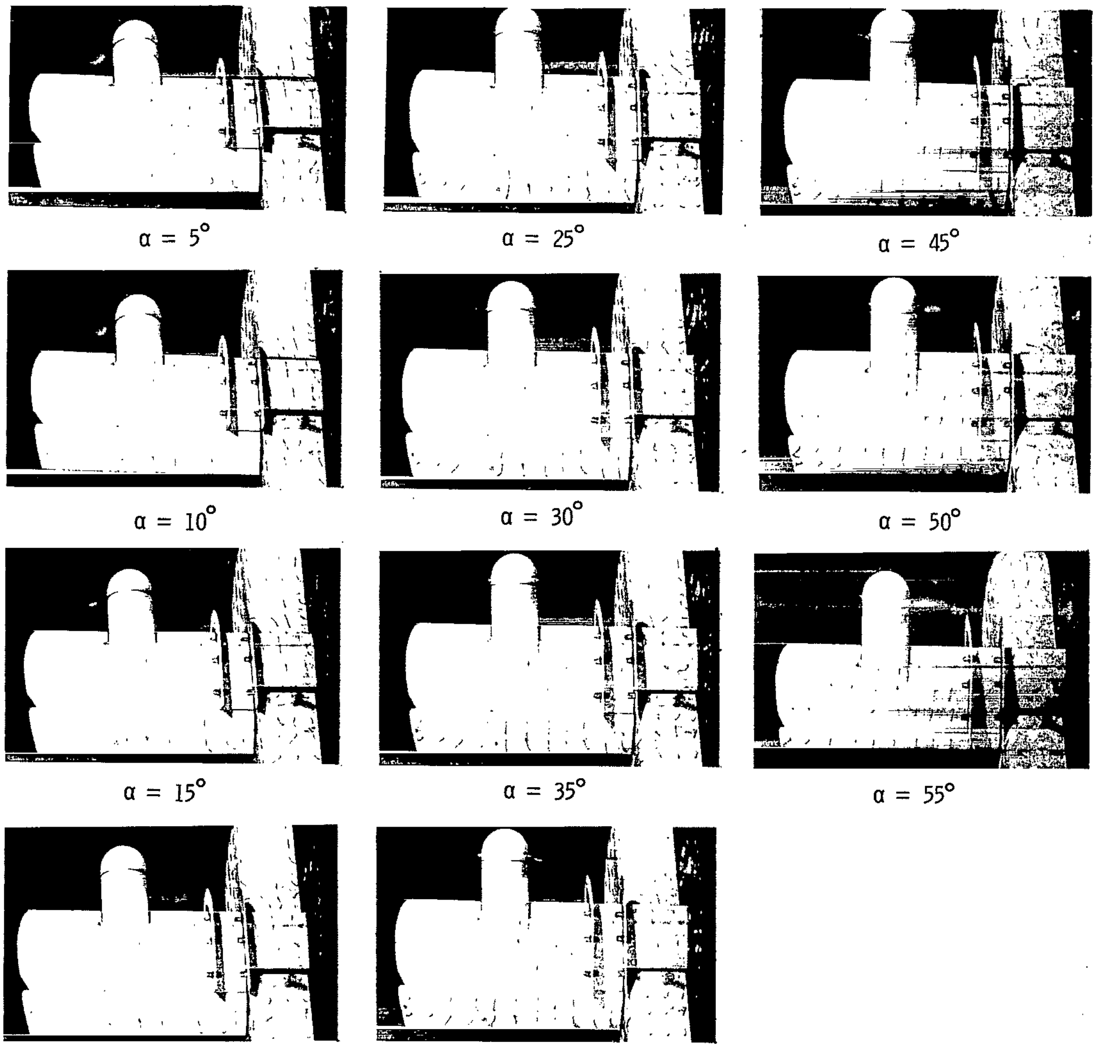
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 25.- Continued.



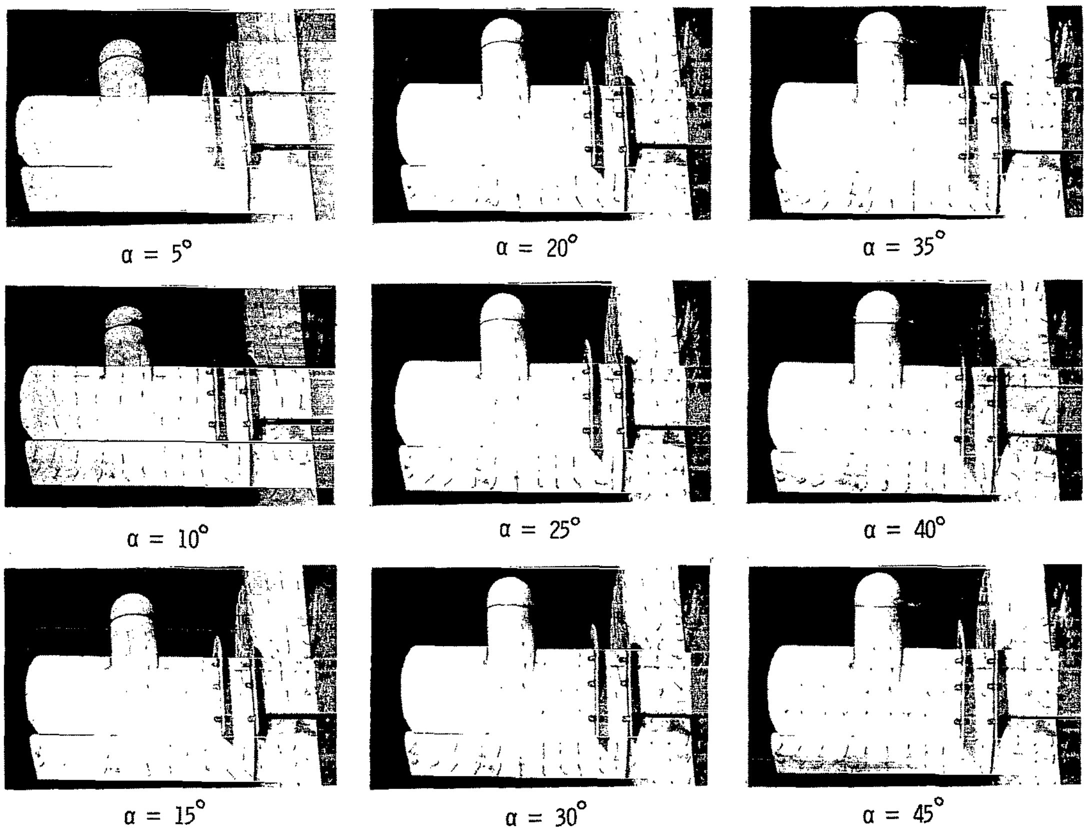
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 25.- Continued.



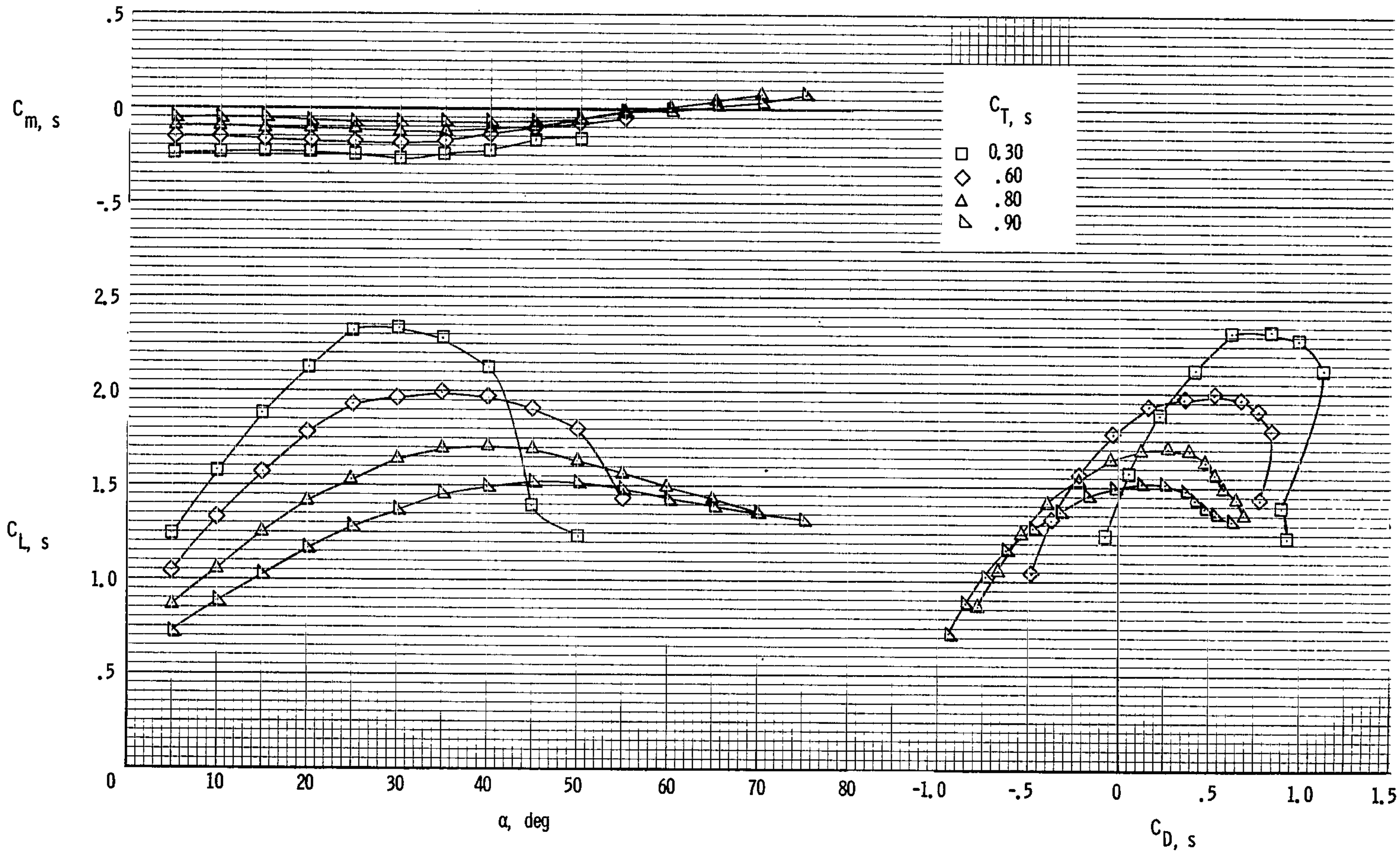
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 25.- Continued.



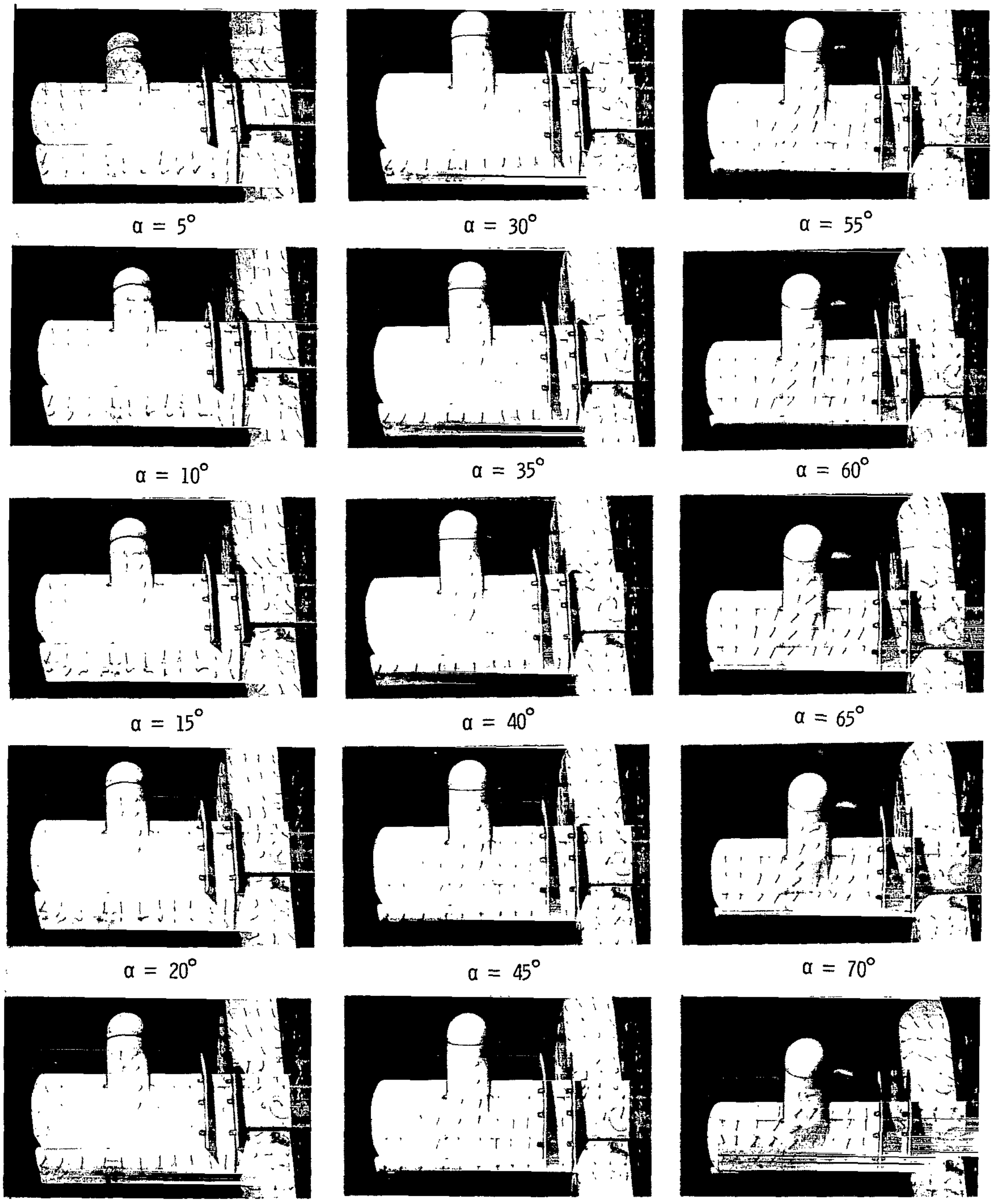
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 25.- Concluded.



(a) Aerodynamic characteristics.

Figure 26.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Fences on; $\delta_f = 40^o$.



$\alpha = 5^\circ$ $\alpha = 30^\circ$ $\alpha = 55^\circ$

$\alpha = 10^\circ$ $\alpha = 35^\circ$ $\alpha = 60^\circ$

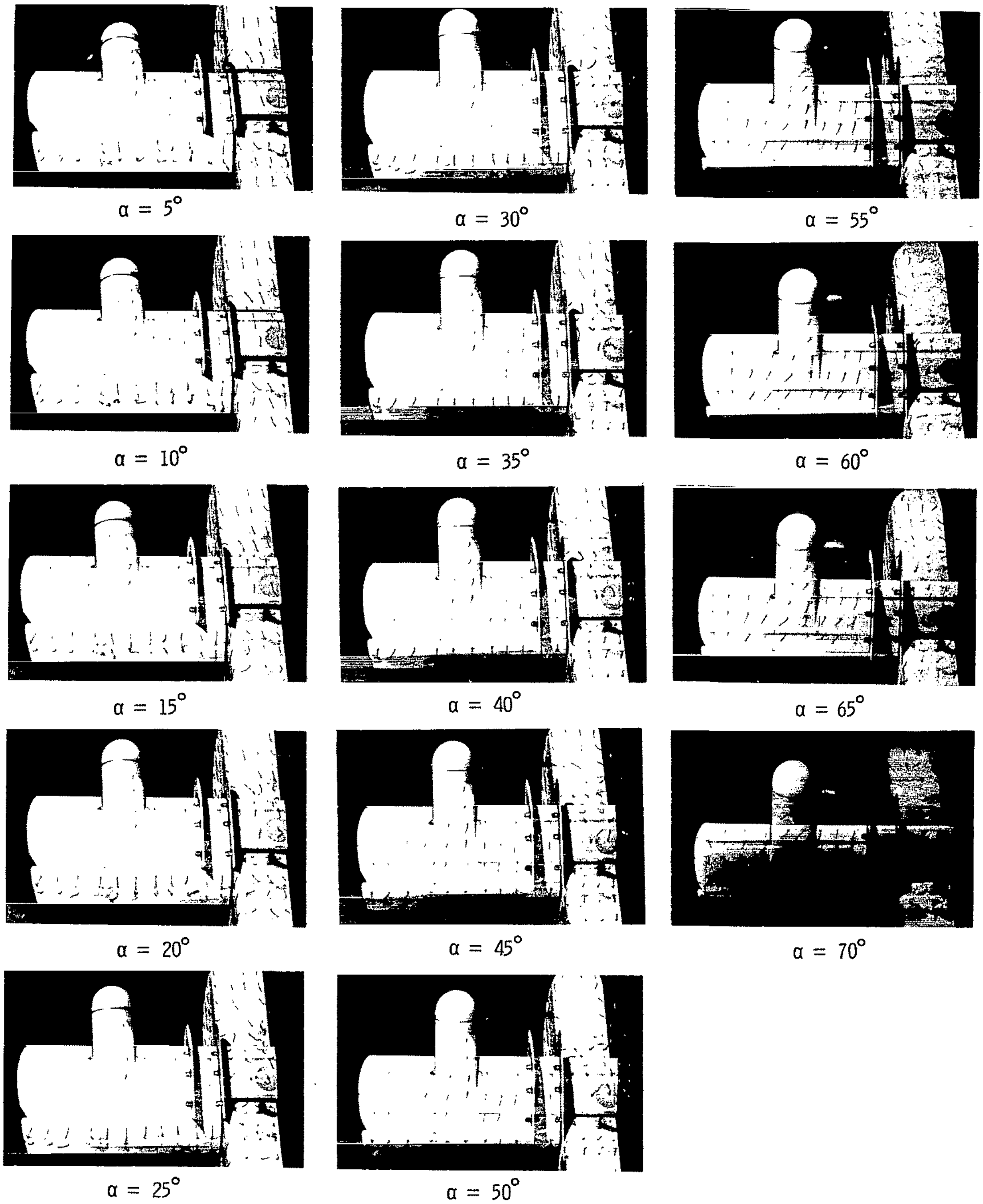
$\alpha = 15^\circ$ $\alpha = 40^\circ$ $\alpha = 65^\circ$

$\alpha = 20^\circ$ $\alpha = 45^\circ$ $\alpha = 70^\circ$

$\alpha = 25^\circ$ $\alpha = 50^\circ$ $\alpha = 75^\circ$

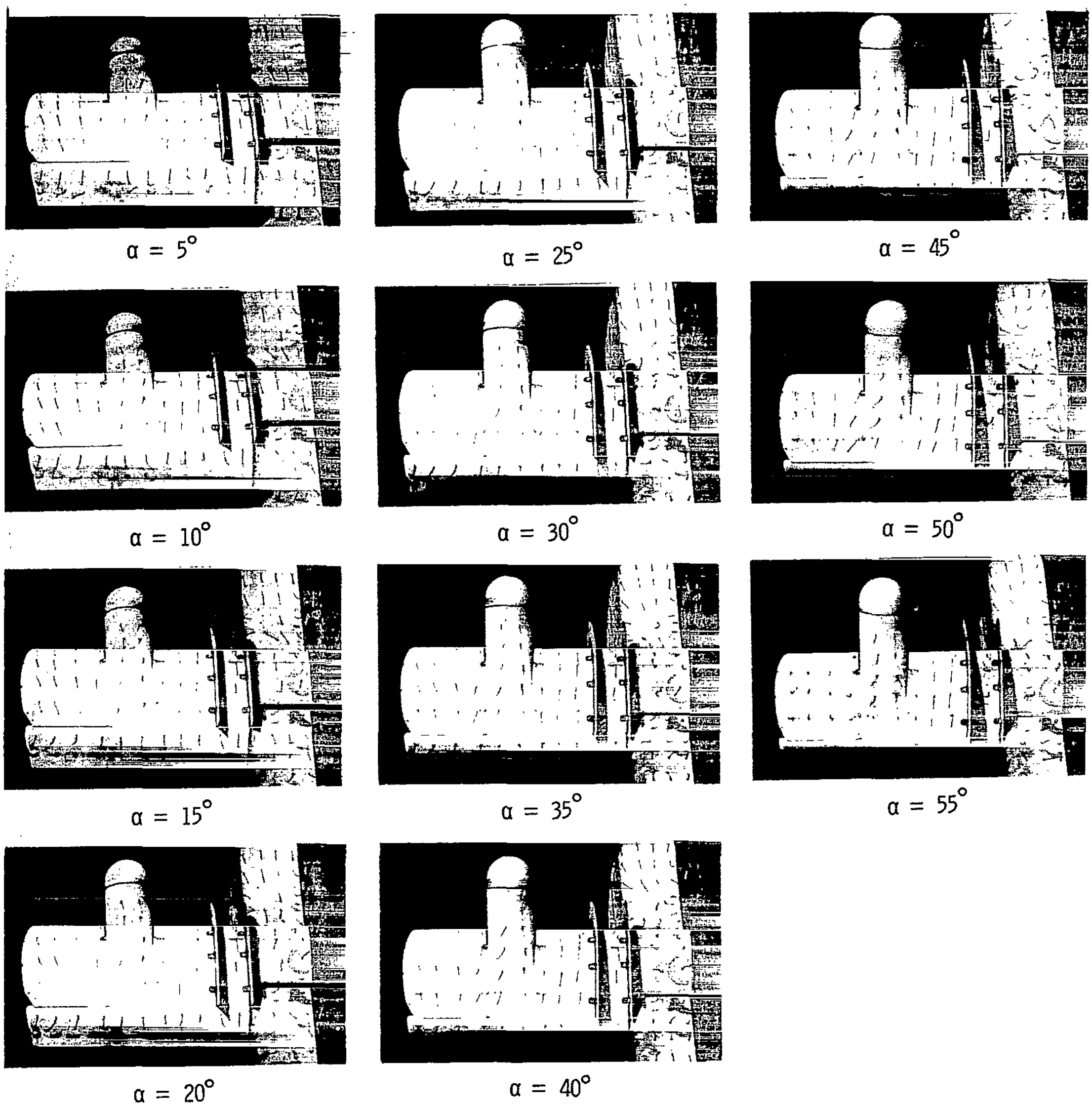
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 26.- Continued.



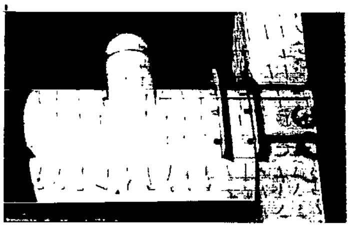
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 26.- Continued.

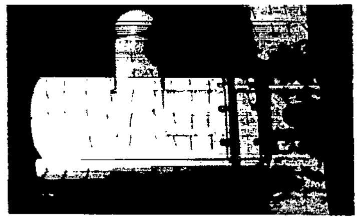


(d) Flow characteristics; $C_{T,s}$ = 0.60.

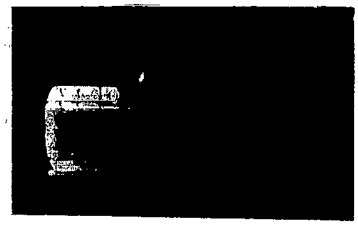
Figure 26.- Continued.



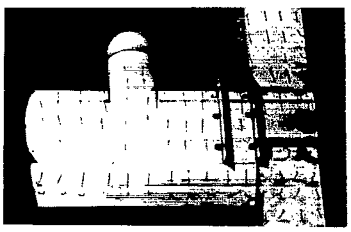
$\alpha = 5^\circ$



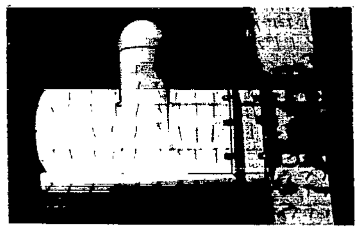
$\alpha = 25^\circ$



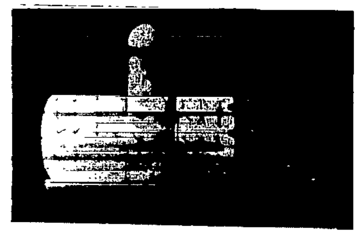
$\alpha = 40^\circ$



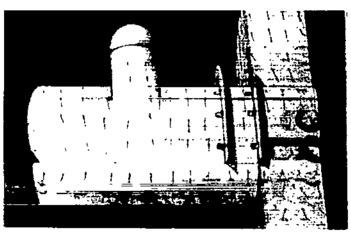
$\alpha = 10^\circ$



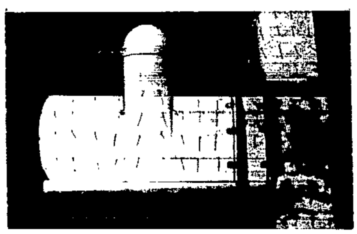
$\alpha = 30^\circ$



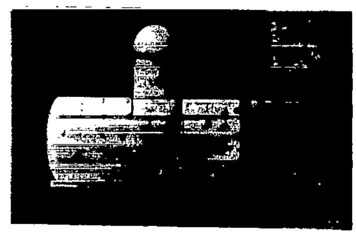
$\alpha = 45^\circ$



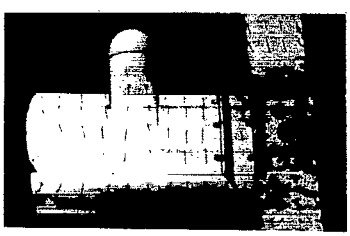
$\alpha = 15^\circ$



$\alpha = 35^\circ$



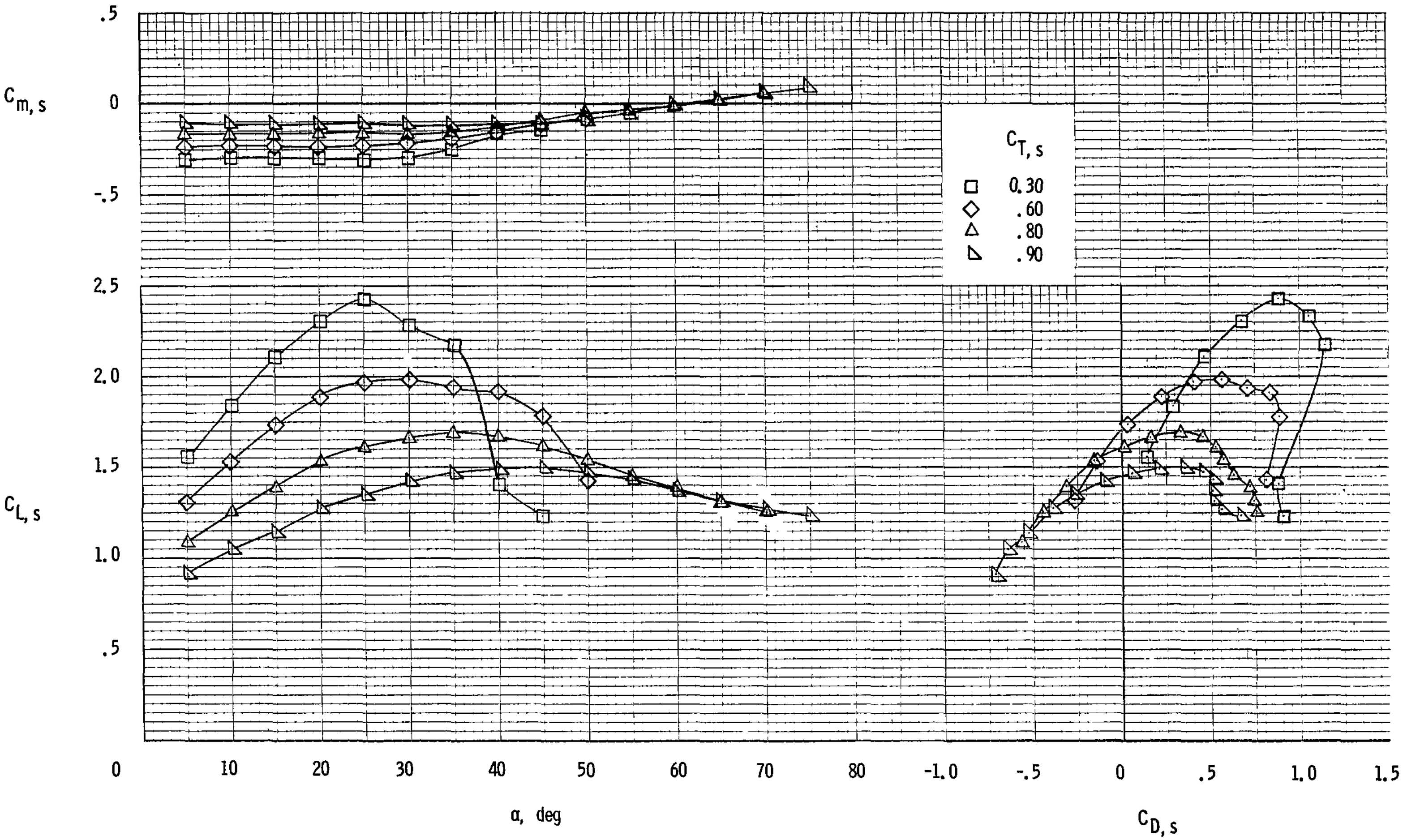
$\alpha = 50^\circ$



$\alpha = 20^\circ$

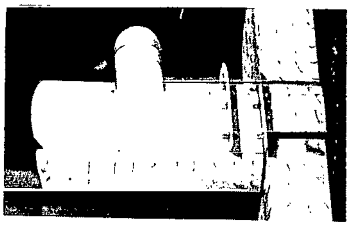
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 26.- Concluded.

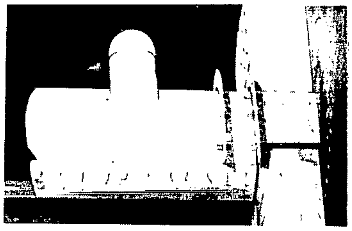


(a) Aerodynamic characteristics.

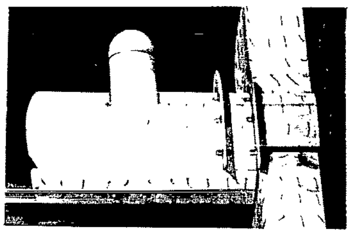
Figure 27.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Fences on; $\delta_f = 60^{0}$.



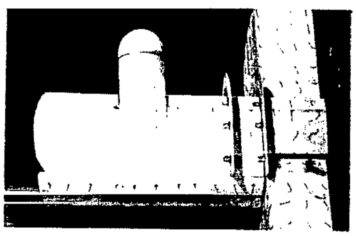
$\alpha = 5^\circ$



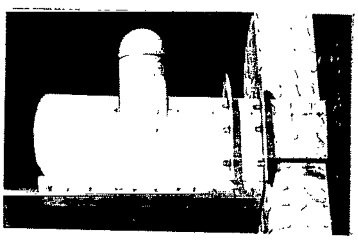
$\alpha = 10^\circ$



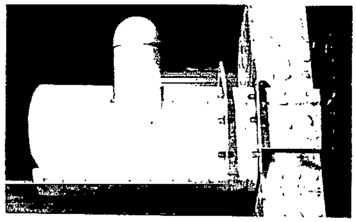
$\alpha = 15^\circ$



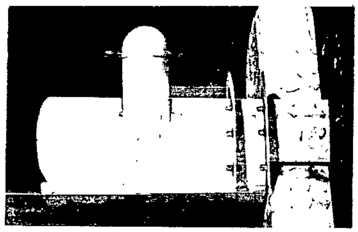
$\alpha = 20^\circ$



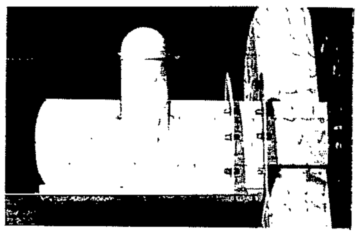
$\alpha = 25^\circ$



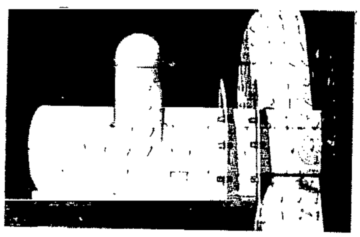
$\alpha = 30^\circ$



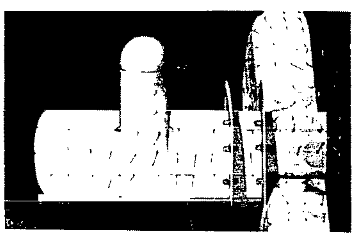
$\alpha = 35^\circ$



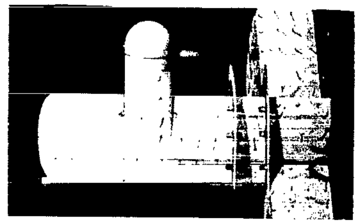
$\alpha = 40^\circ$



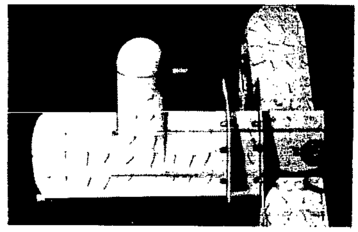
$\alpha = 45^\circ$



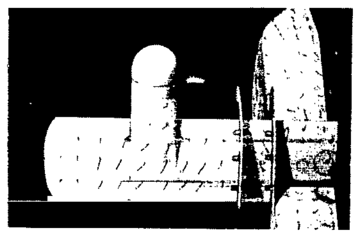
$\alpha = 50^\circ$



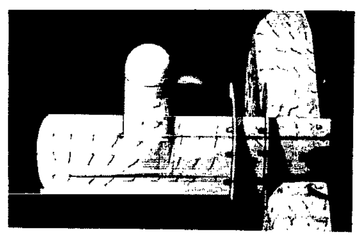
$\alpha = 55^\circ$



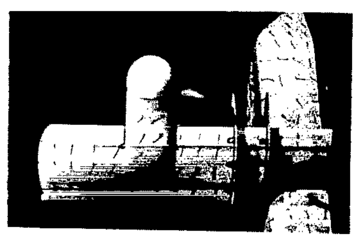
$\alpha = 60^\circ$



$\alpha = 65^\circ$



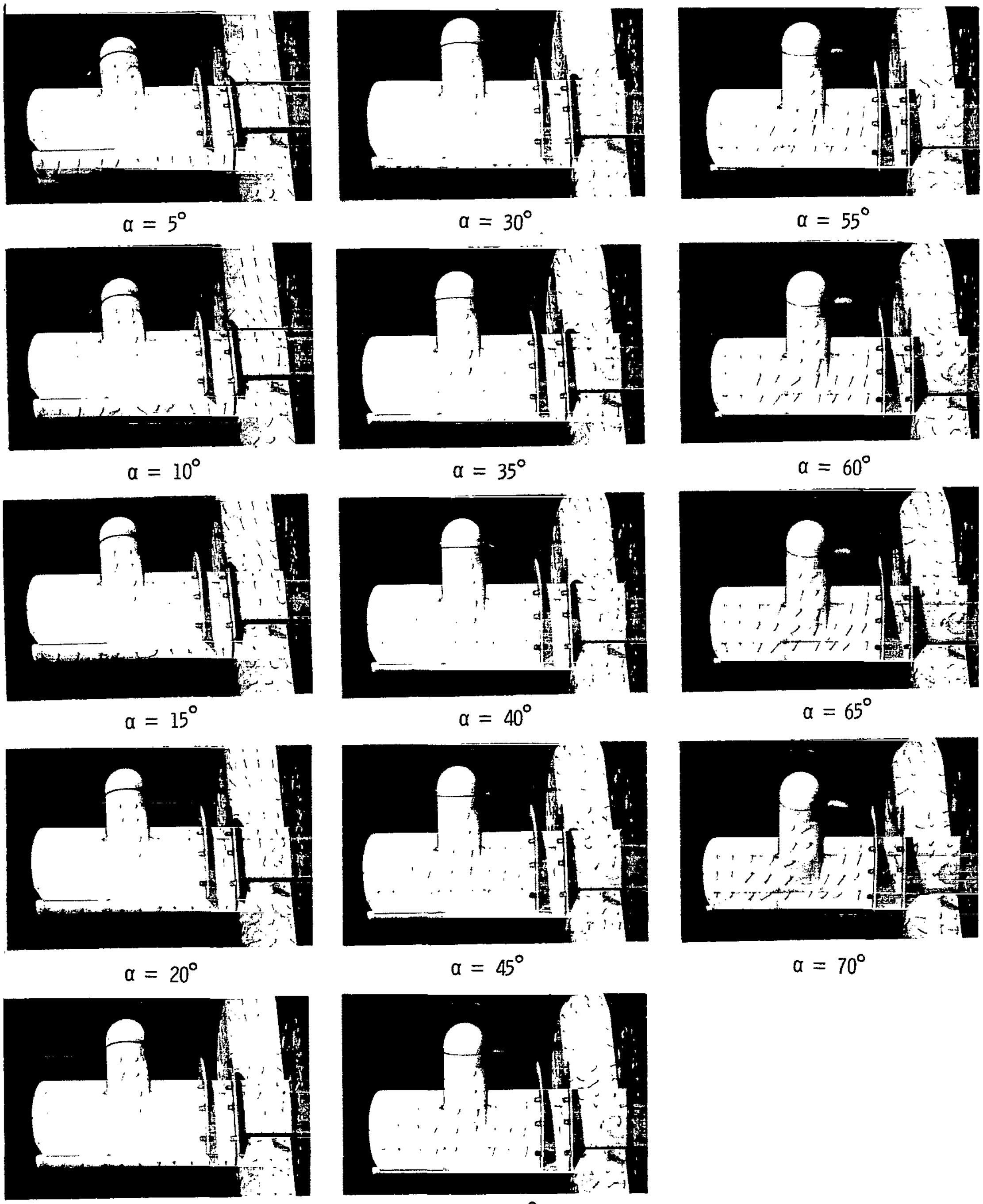
$\alpha = 70^\circ$



$\alpha = 75^\circ$

(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 27.- Continued.



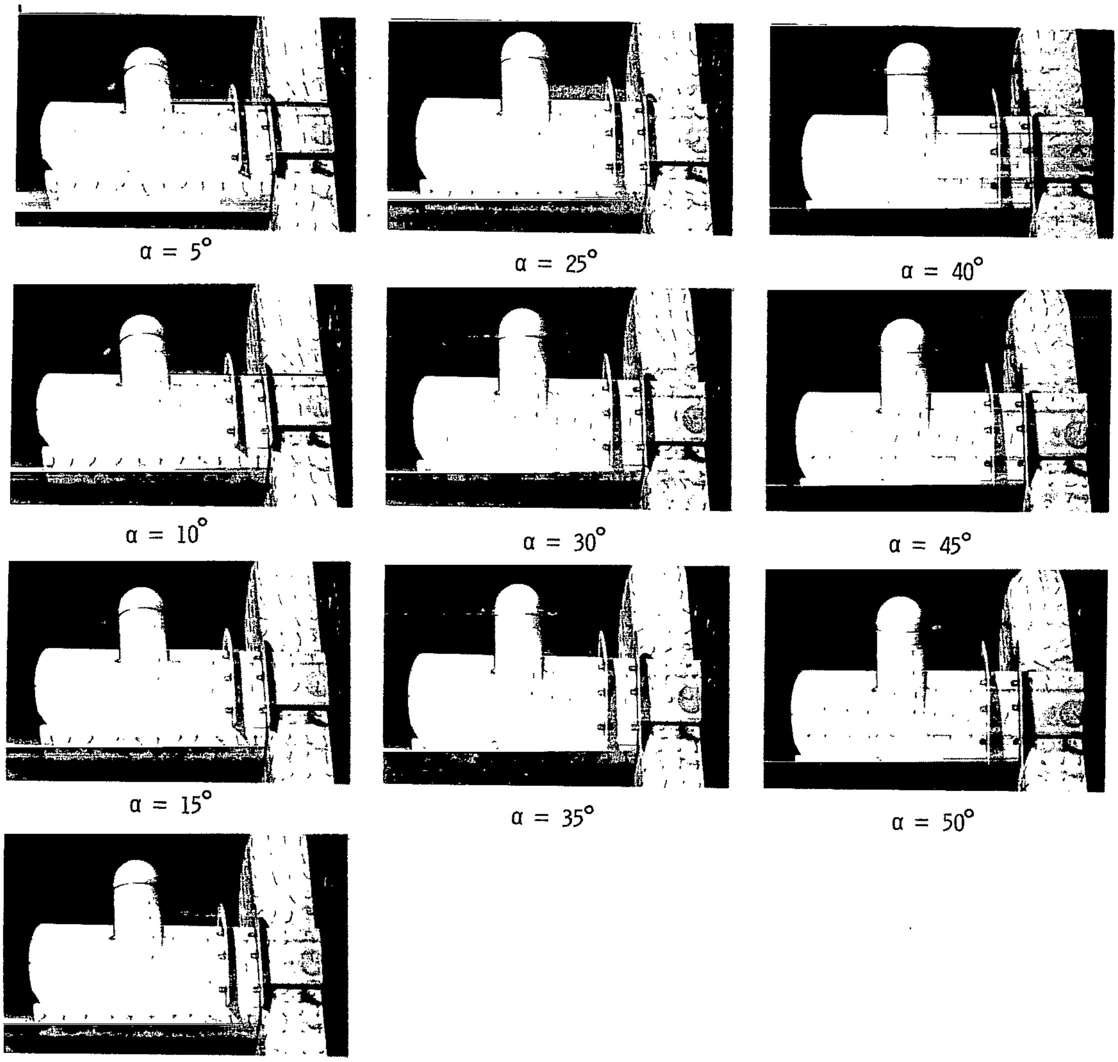
$\alpha = 5^\circ$ $\alpha = 10^\circ$ $\alpha = 15^\circ$ $\alpha = 20^\circ$ $\alpha = 25^\circ$

$\alpha = 30^\circ$ $\alpha = 35^\circ$ $\alpha = 40^\circ$ $\alpha = 45^\circ$ $\alpha = 50^\circ$

$\alpha = 55^\circ$ $\alpha = 60^\circ$ $\alpha = 65^\circ$ $\alpha = 70^\circ$

(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 27.- Continued.



$\alpha = 5^\circ$ | $\alpha = 25^\circ$ | $\alpha = 40^\circ$

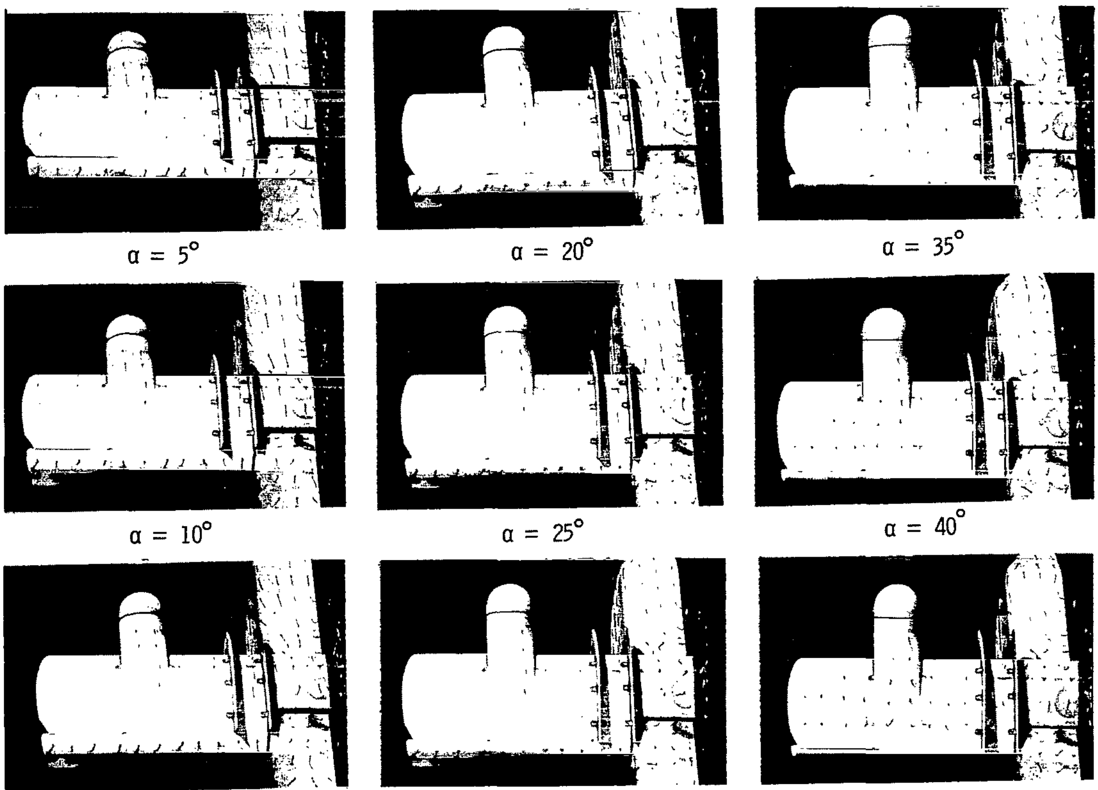
$\alpha = 10^\circ$ | $\alpha = 30^\circ$ | $\alpha = 45^\circ$

$\alpha = 15^\circ$ | $\alpha = 35^\circ$ | $\alpha = 50^\circ$

$\alpha = 20^\circ$

(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 27.- Continued.



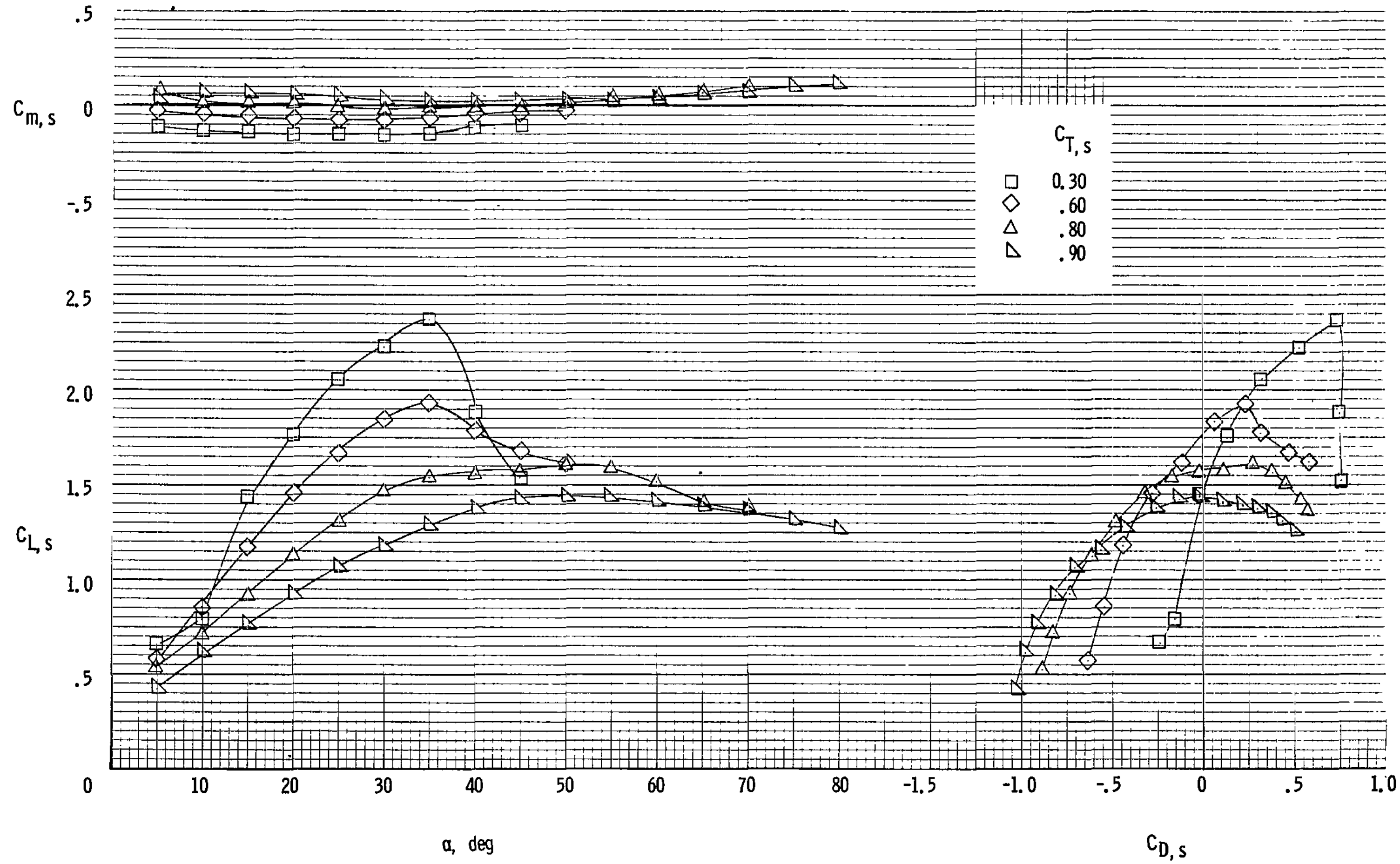
$\alpha = 5^\circ$ $\alpha = 20^\circ$ $\alpha = 35^\circ$

$\alpha = 10^\circ$ $\alpha = 25^\circ$ $\alpha = 40^\circ$

$\alpha = 15^\circ$ $\alpha = 30^\circ$ $\alpha = 45^\circ$

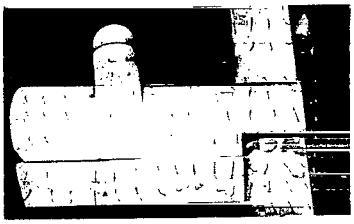
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 27.- Concluded.

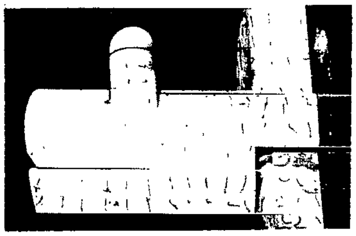


(a) Aerodynamic characteristics.

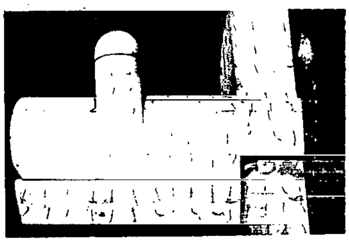
Figure 28.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Inboard slat on; $\delta_f = 20^{\circ}$.



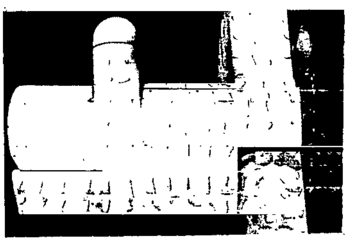
$\alpha = 10^\circ$



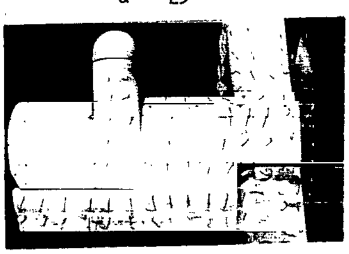
$\alpha = 15^\circ$



$\alpha = 20^\circ$



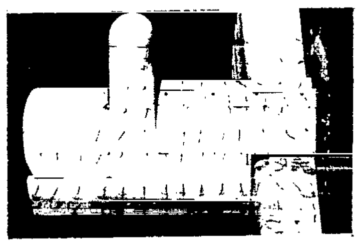
$\alpha = 25^\circ$



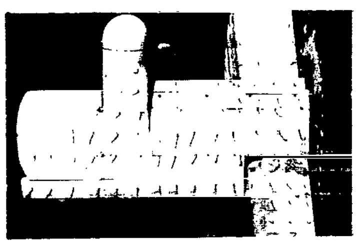
$\alpha = 30^\circ$

$\alpha = 35^\circ$

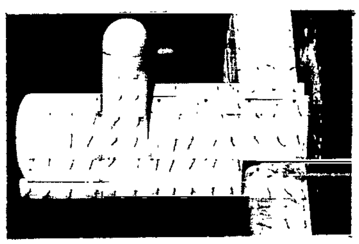
$\alpha = 40^\circ$



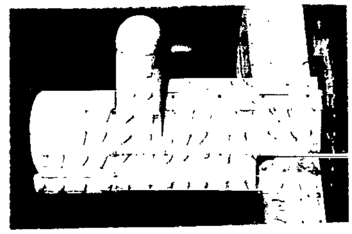
$\alpha = 45^\circ$



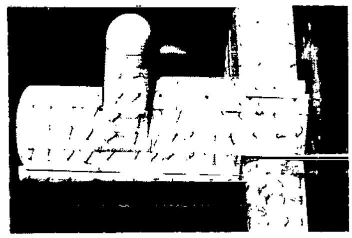
$\alpha = 50^\circ$



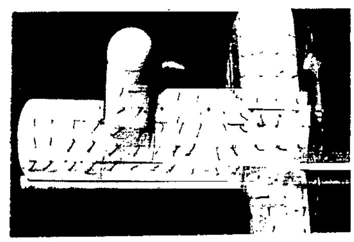
$\alpha = 55^\circ$



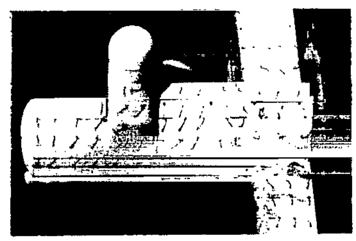
$\alpha = 60^\circ$



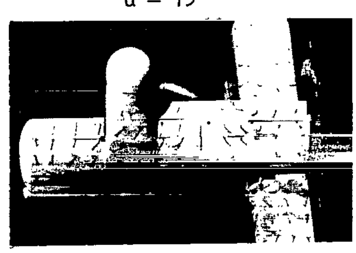
$\alpha = 65^\circ$



$\alpha = 70^\circ$



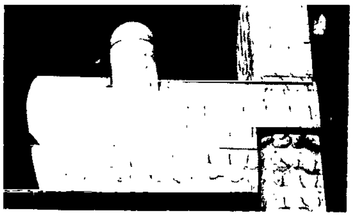
$\alpha = 75^\circ$



$\alpha = 80^\circ$

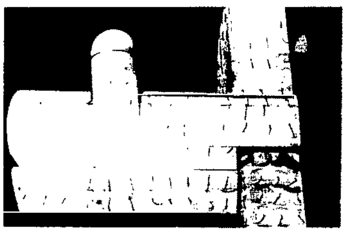
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 28.- Continued.

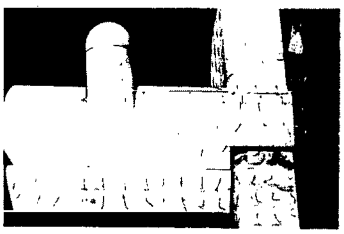


$\alpha = 5^\circ$

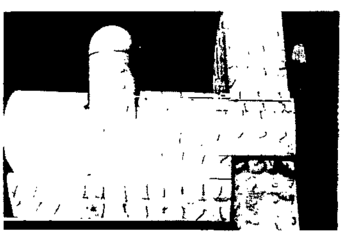
$\alpha = 10^\circ$



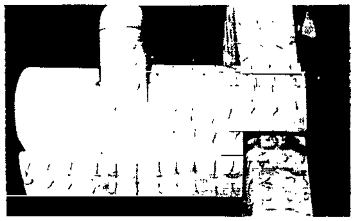
$\alpha = 15^\circ$



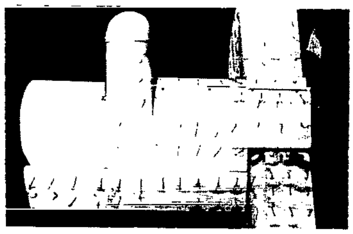
$\alpha = 20^\circ$



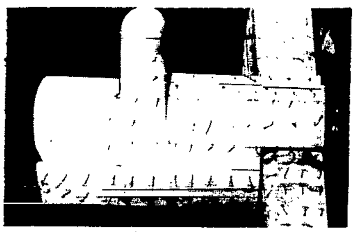
$\alpha = 25^\circ$



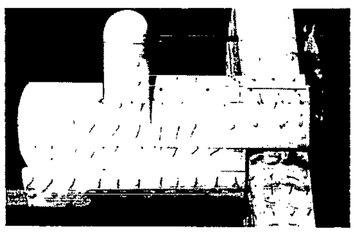
$\alpha = 30^\circ$



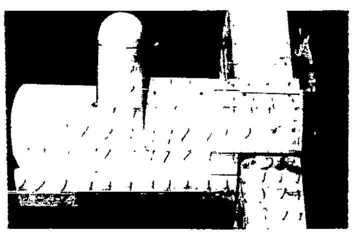
$\alpha = 35^\circ$



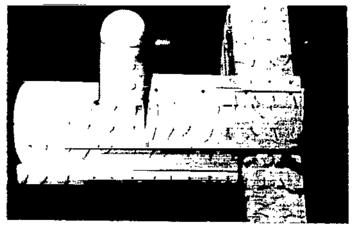
$\alpha = 40^\circ$



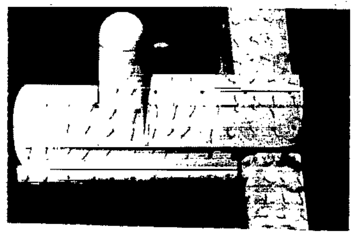
$\alpha = 45^\circ$



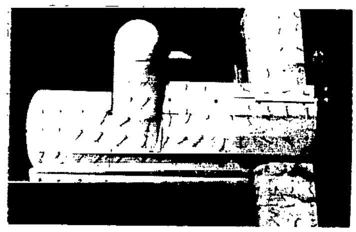
$\alpha = 50^\circ$



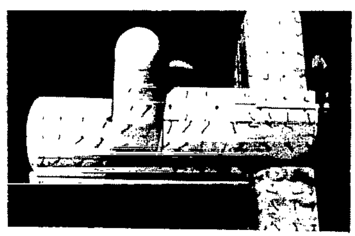
$\alpha = 55^\circ$



$\alpha = 60^\circ$



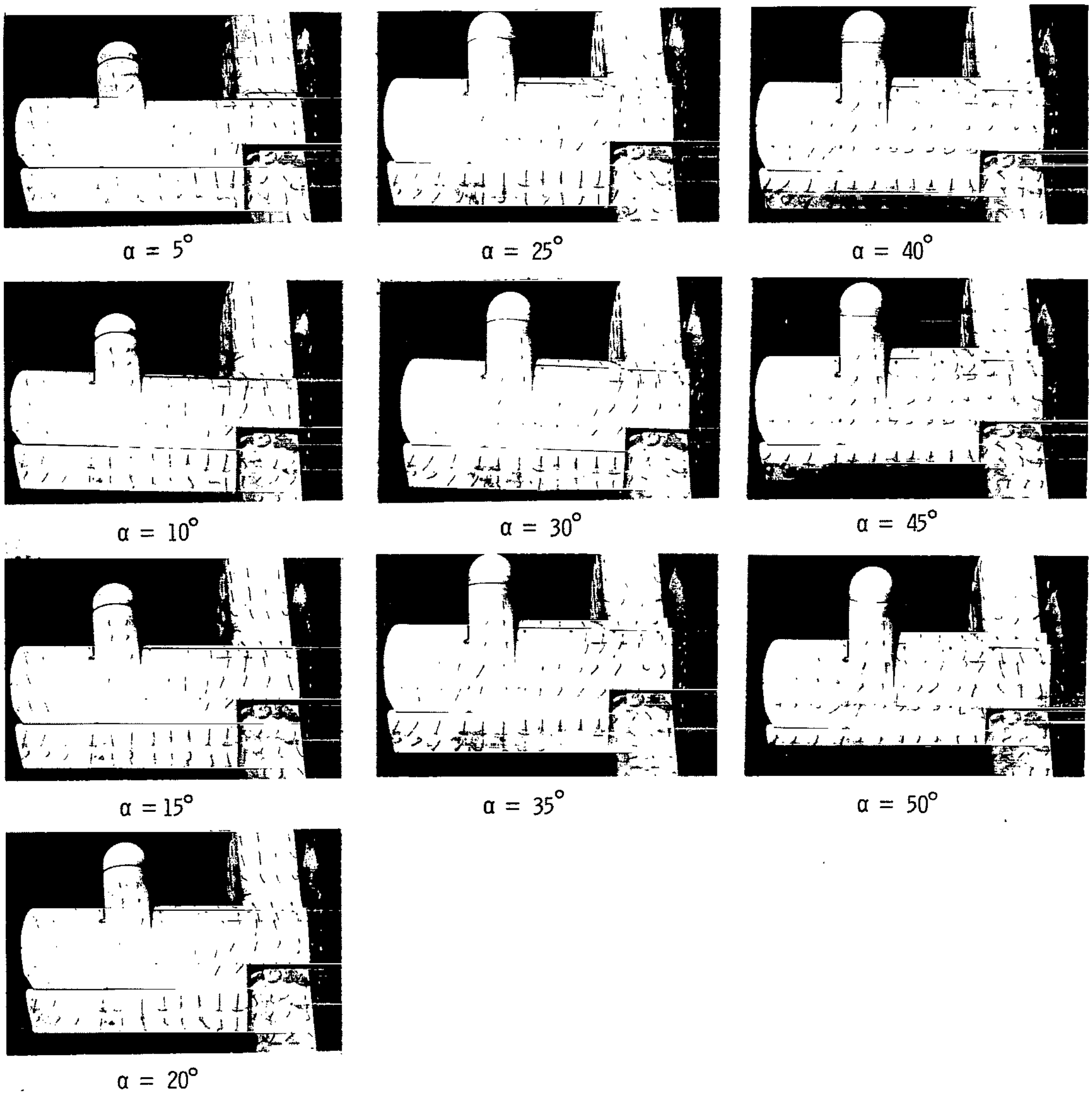
$\alpha = 65^\circ$



$\alpha = 70^\circ$

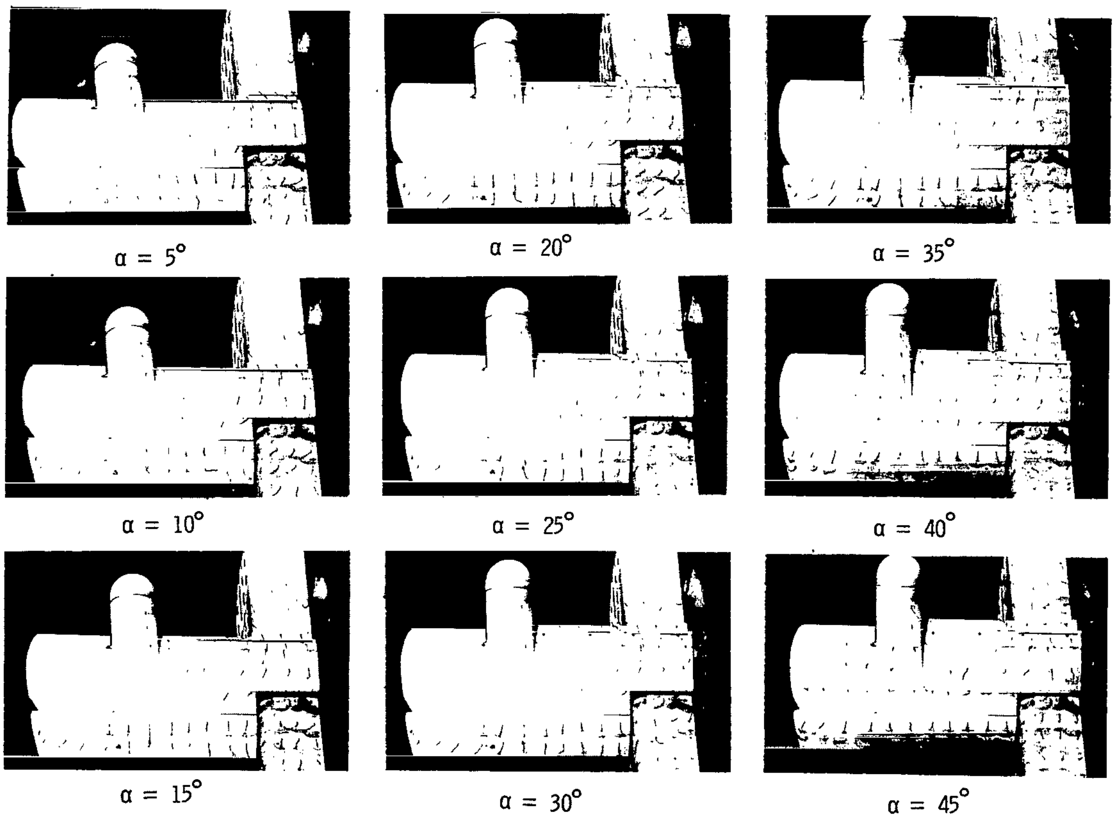
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 28.- Continued.



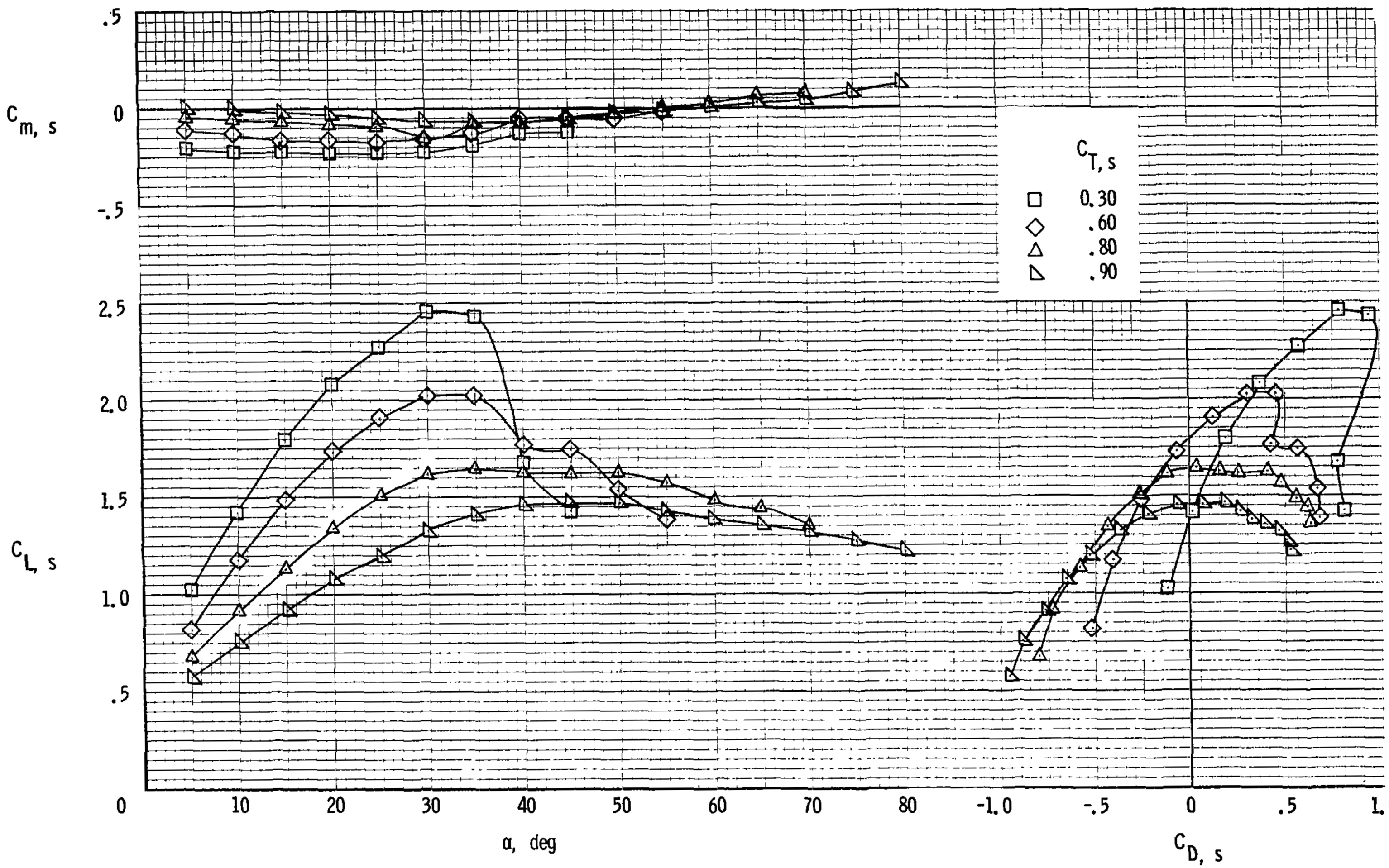
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 28.- Continued.



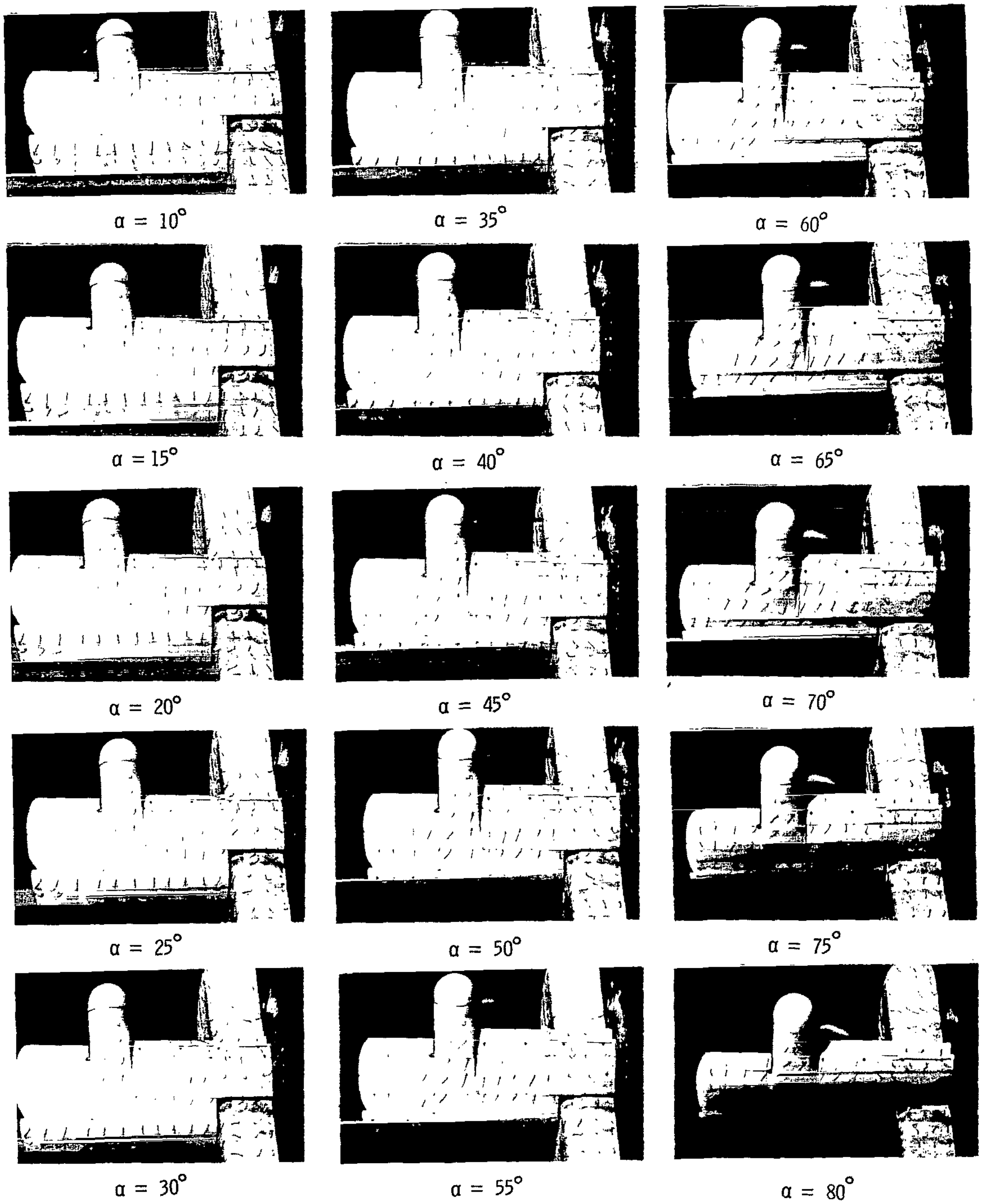
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 28.- Concluded.



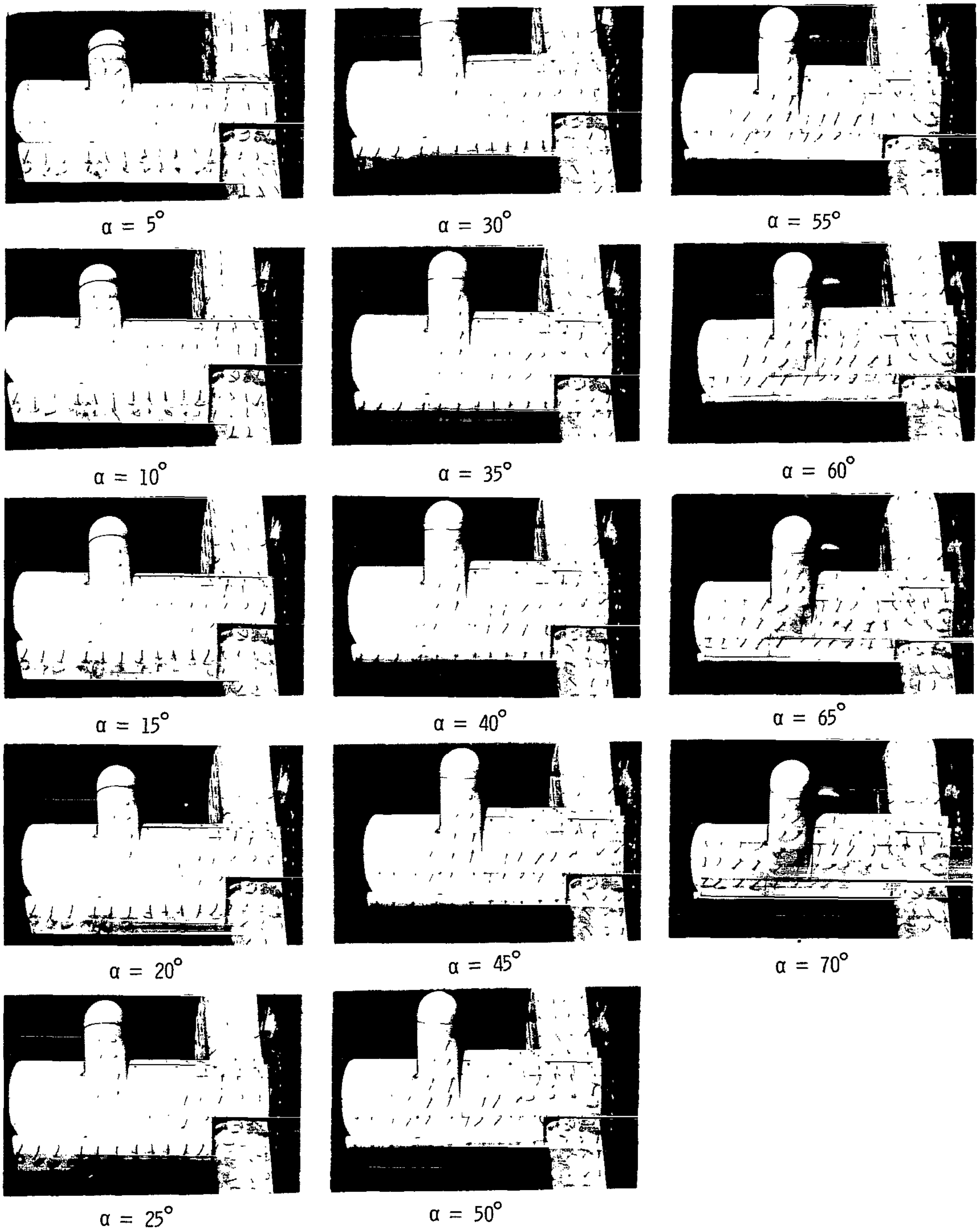
(a) Aerodynamic characteristics.

Figure 29.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Inboard slat on; $\delta_f = 40^{\circ}$.



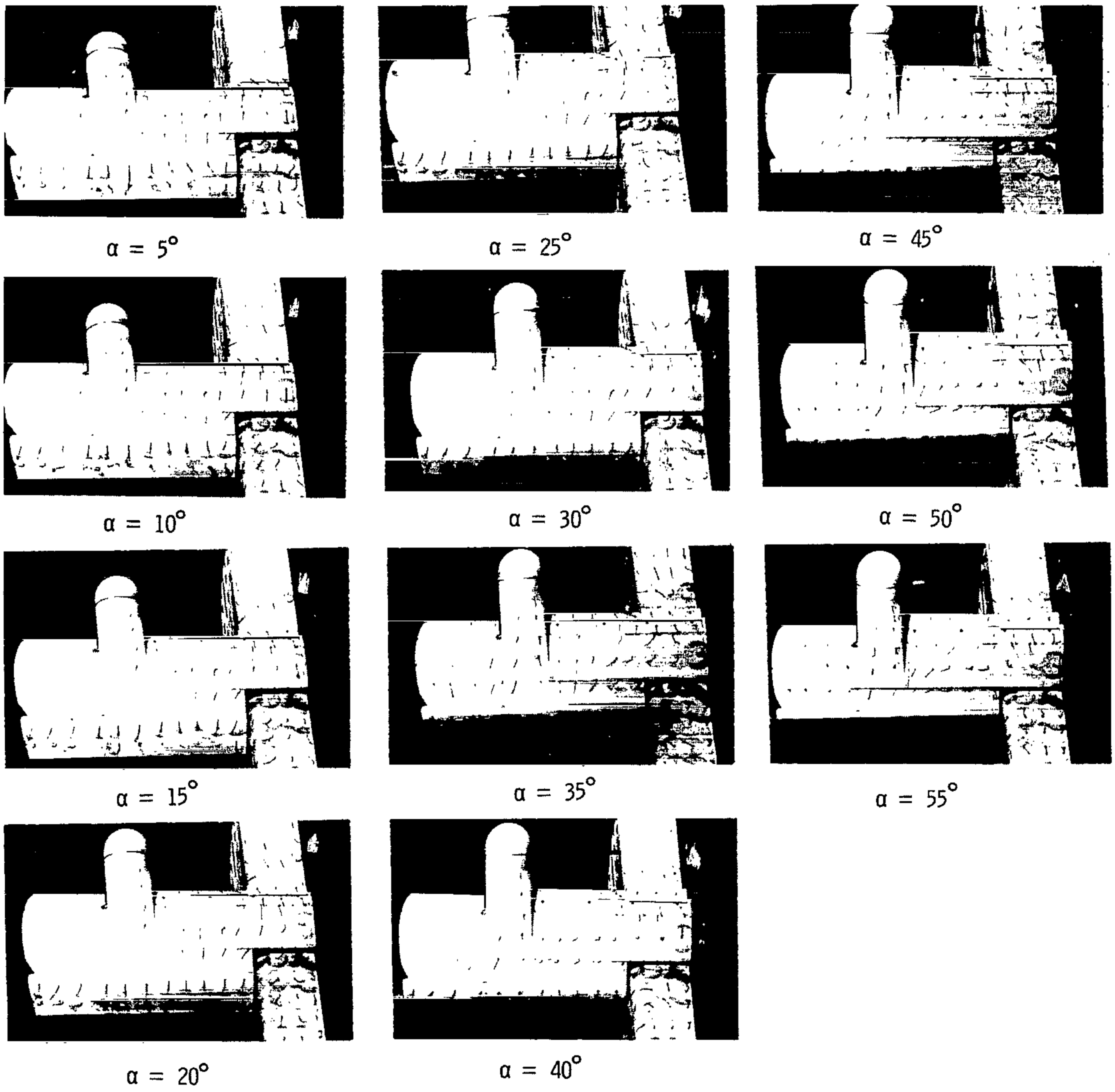
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 29.- Continued.



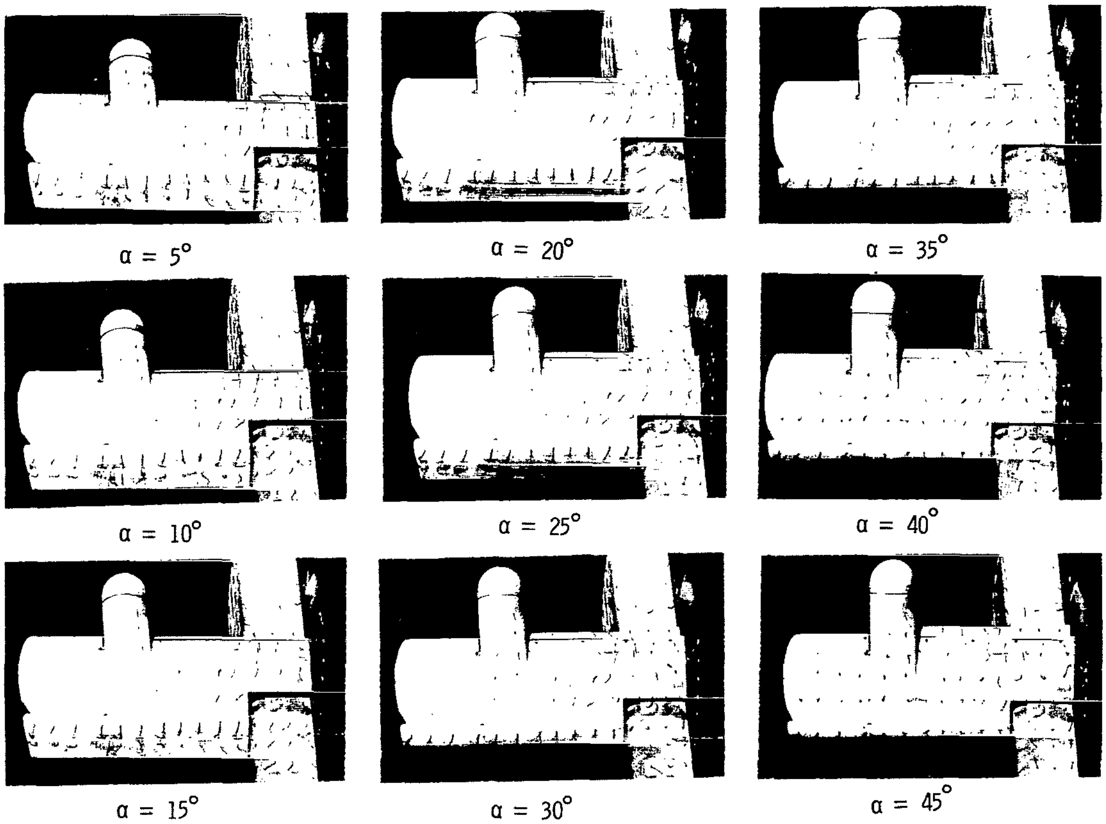
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 29.- Continued.



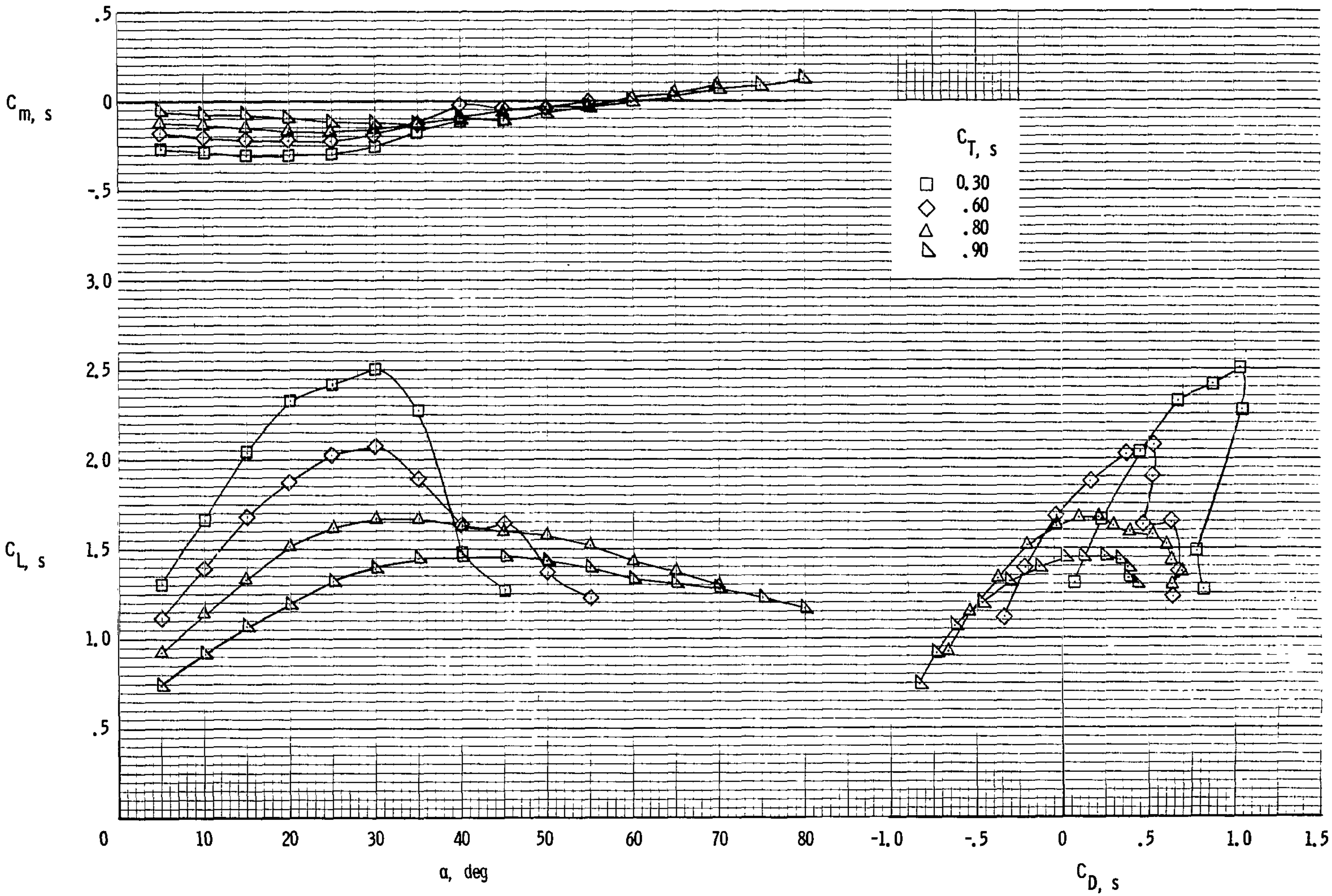
(d) Flow characteristics; $C_{T,s}$ = 0.60.

Figure 29.- Continued.



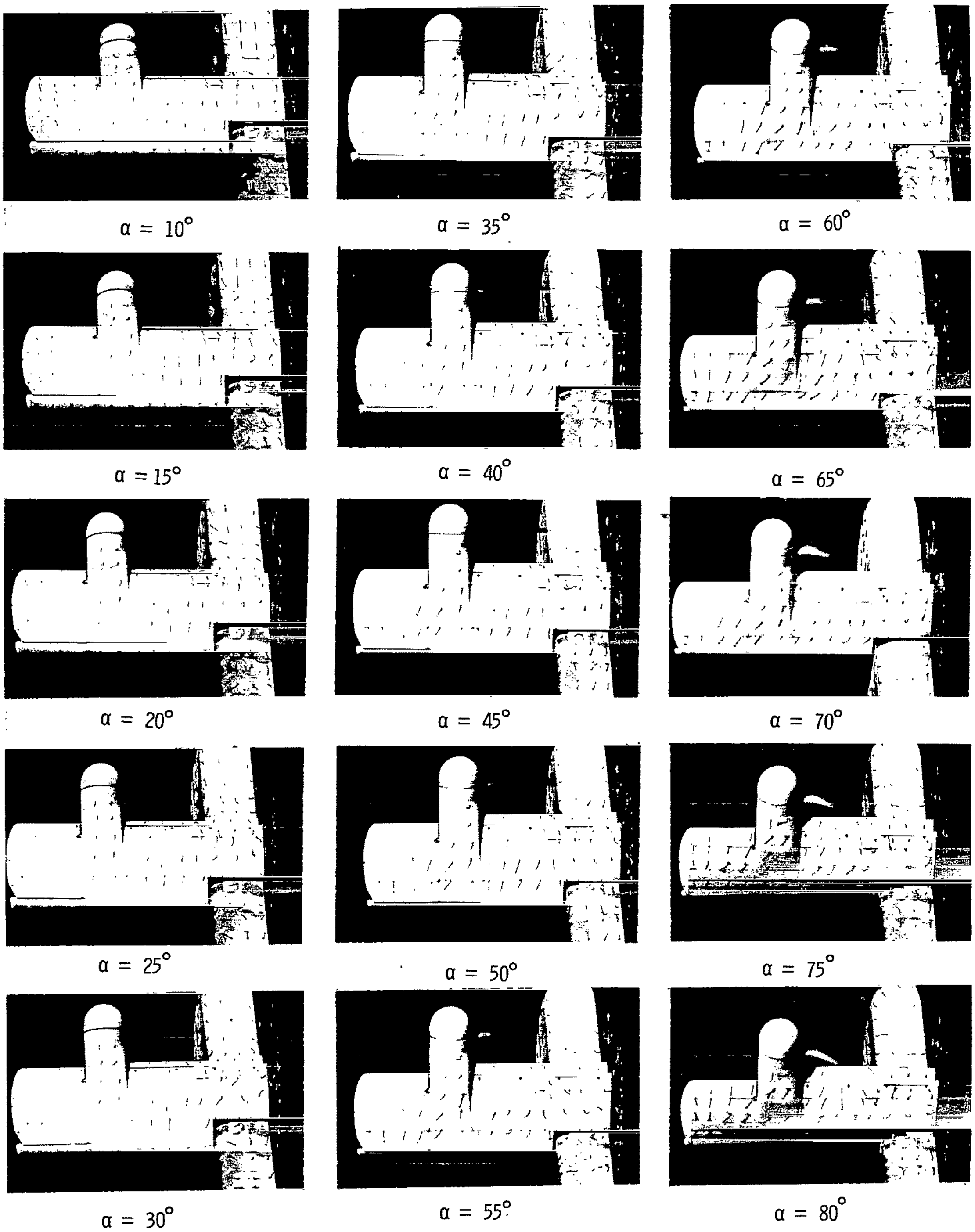
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 29.- Concluded.



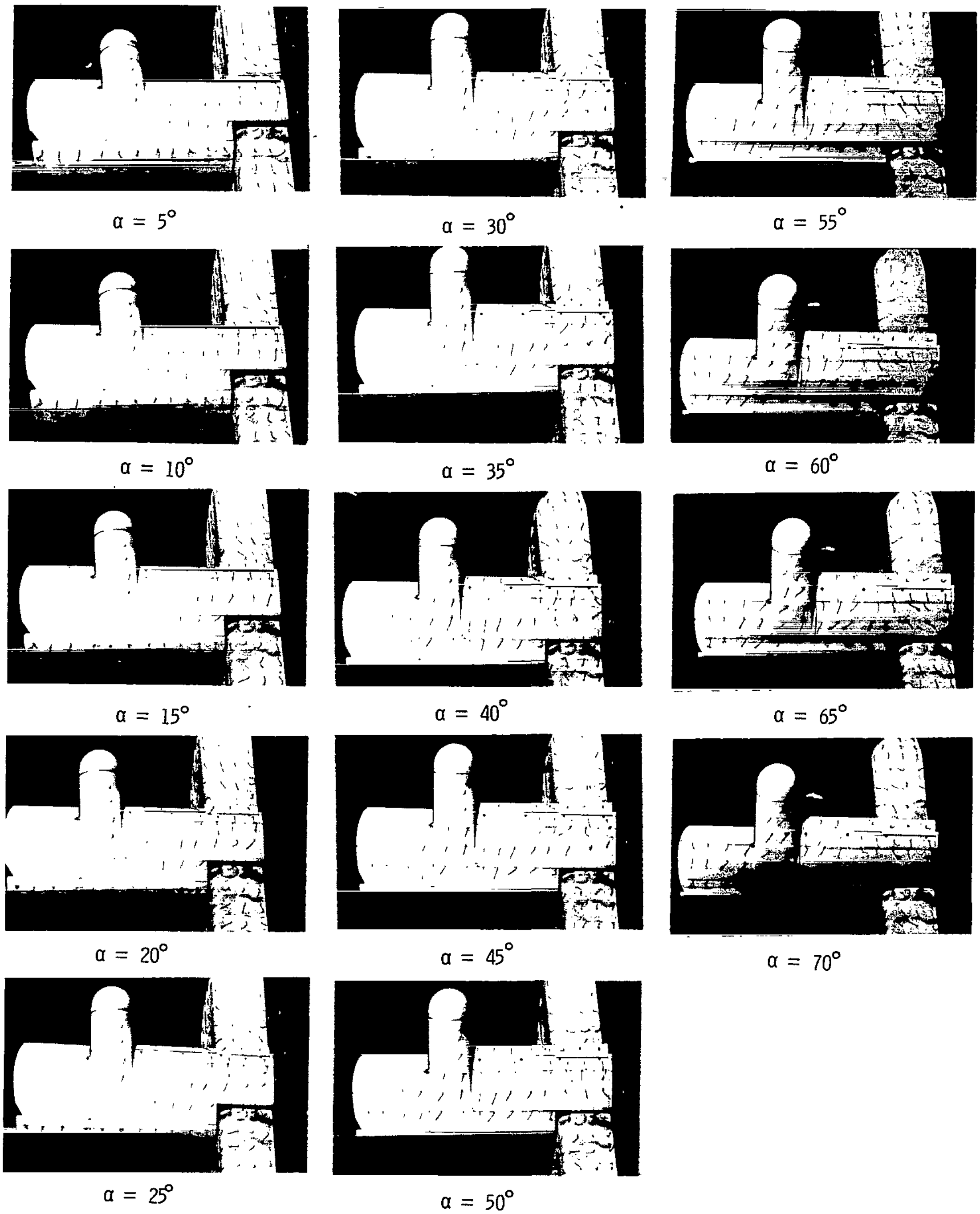
(a) Aerodynamic characteristics.

Figure 30.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Inboard slat on; $\delta_f = 60^0$.



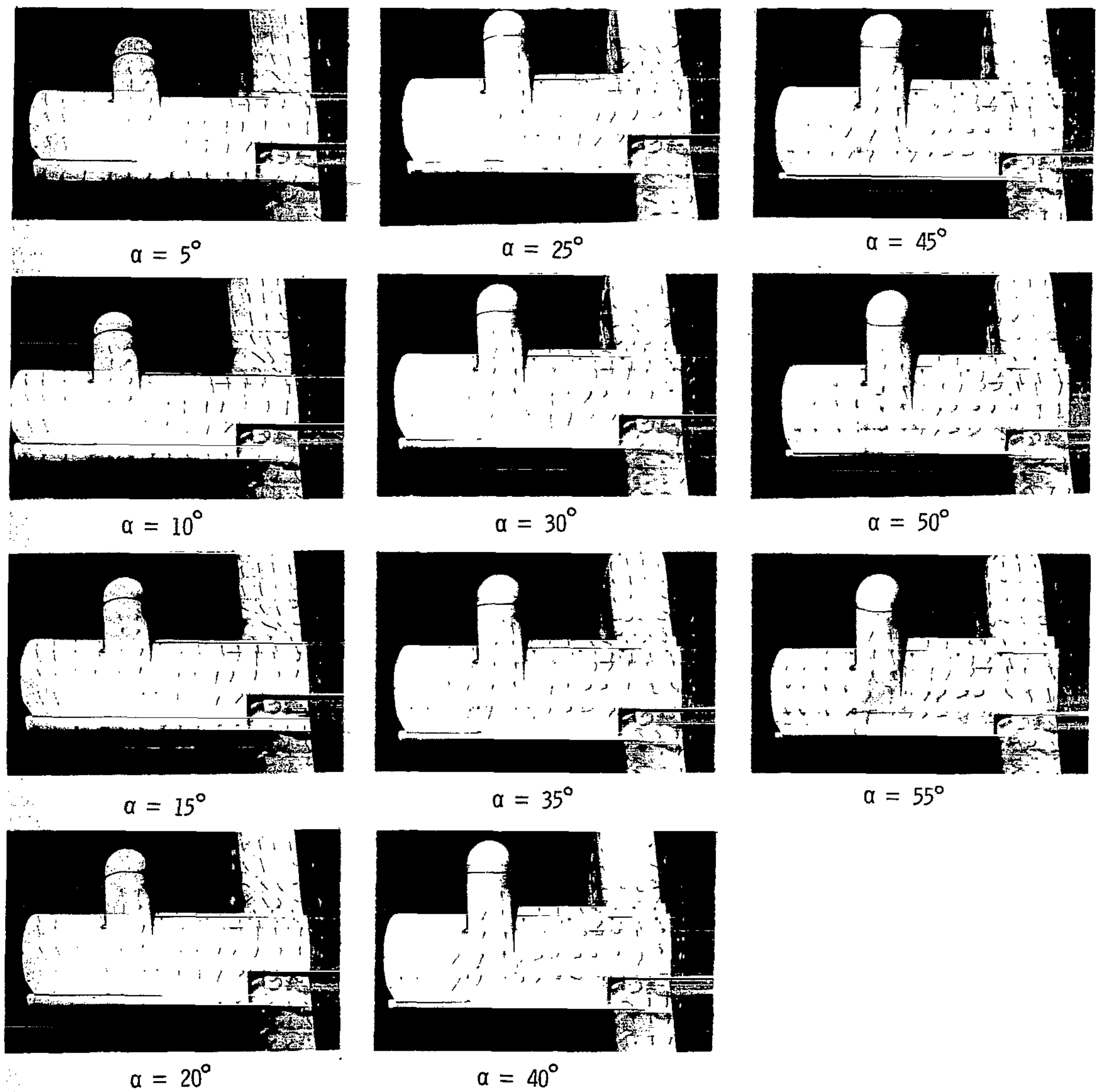
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 30.- Continued.



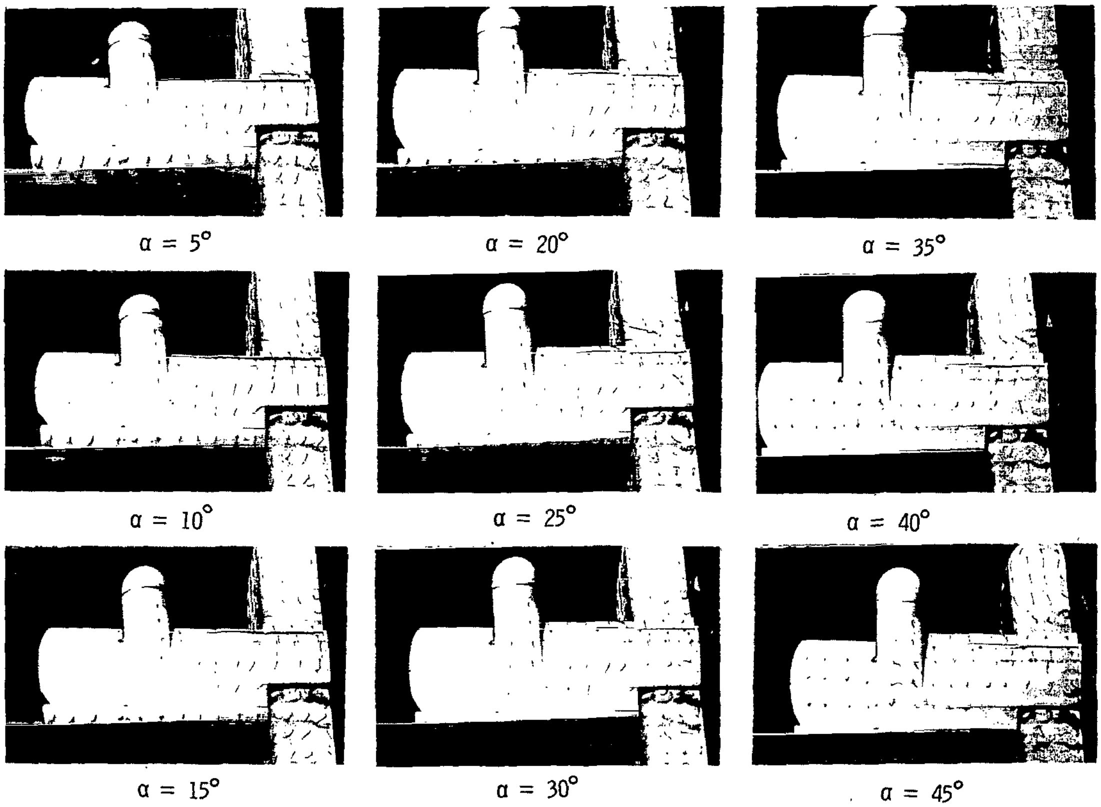
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 30.- Continued.



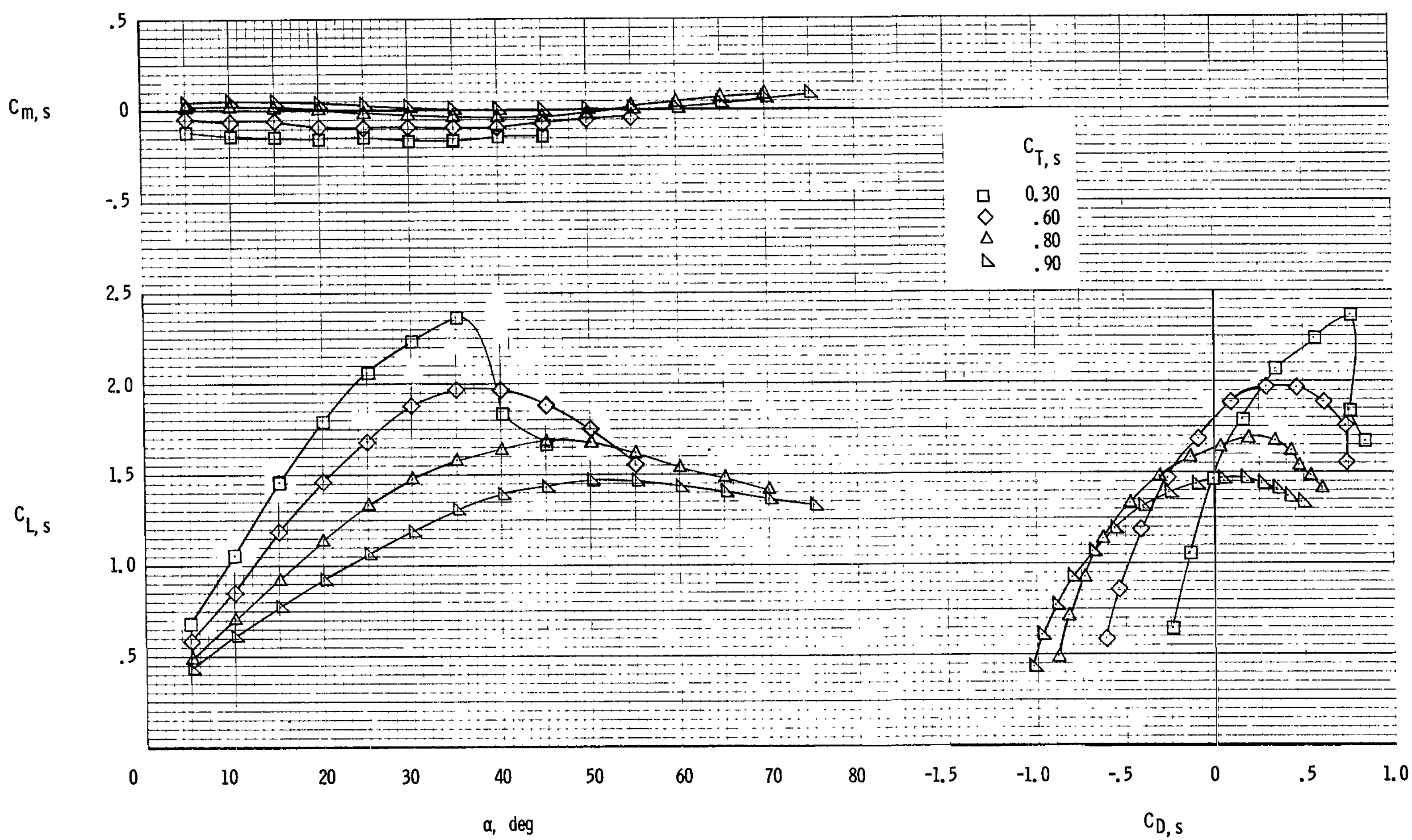
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 30.- Continued.



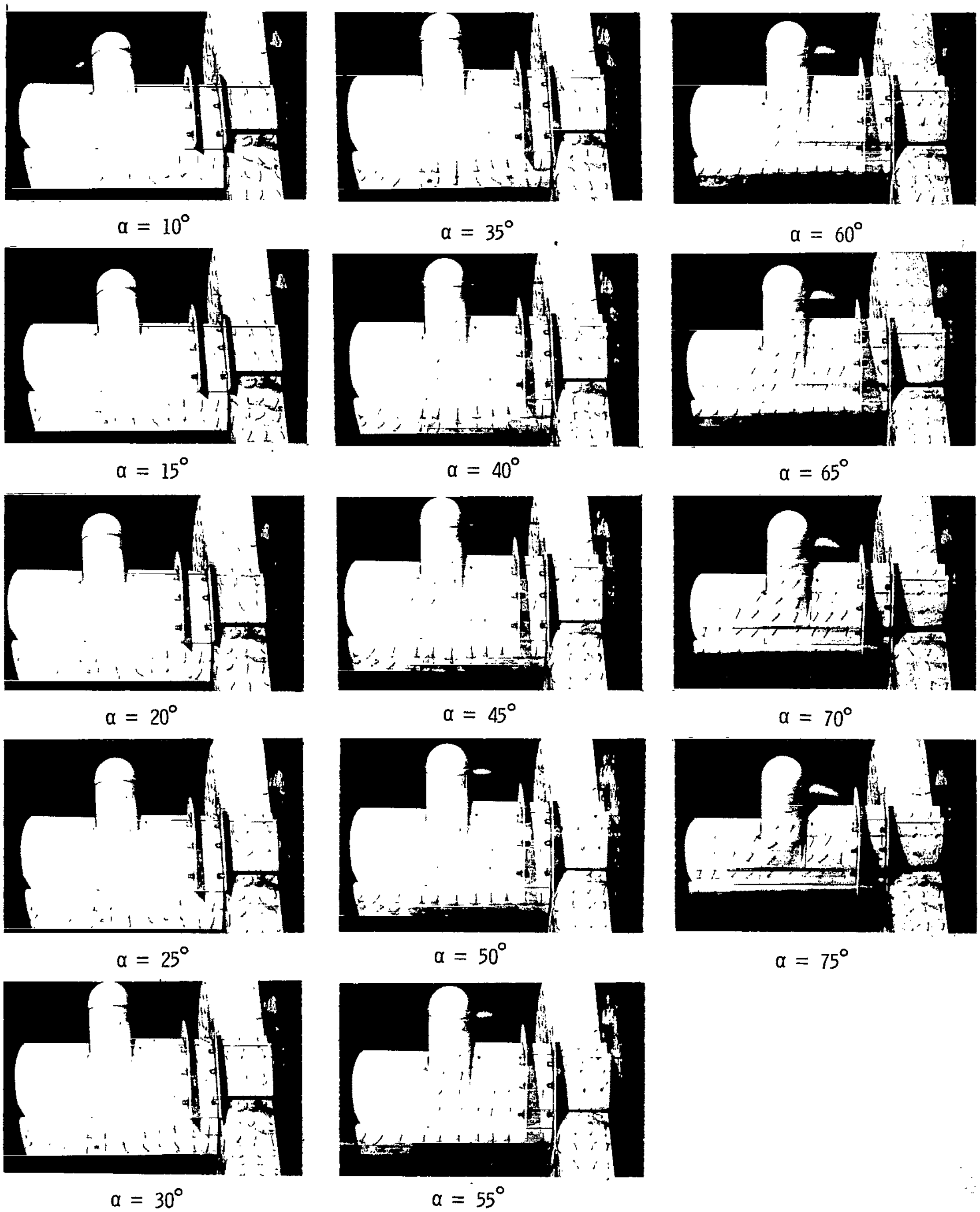
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 30.- Concluded.



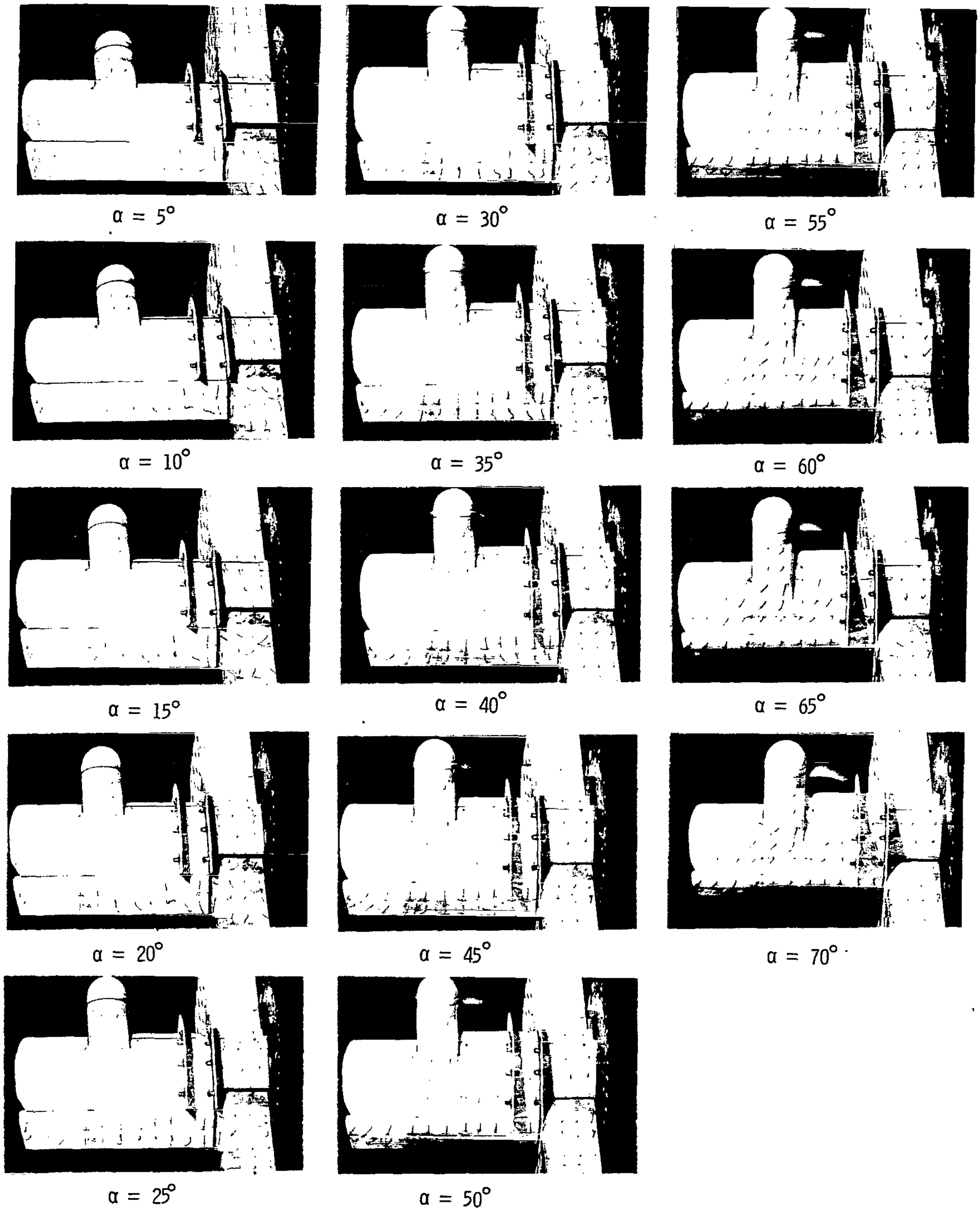
(a) Aerodynamic characteristics.

Figure 31.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Inboard slat on; fences on; $\delta_f = 20^0$.



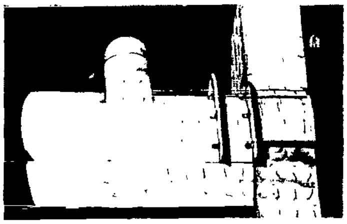
(b) Flow characteristics; $C_{T,s}$ = 0.90.

Figure 31.- Continued.



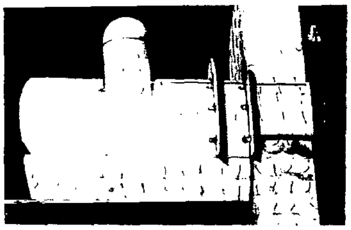
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 31.- Continued.



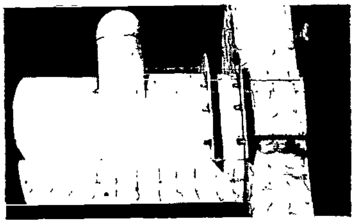
$\alpha = 5^\circ$

$\alpha = 10^\circ$

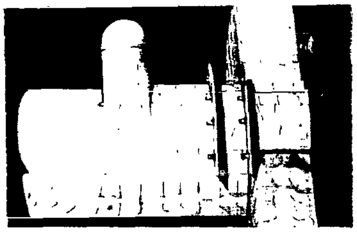


$\alpha = 15^\circ$

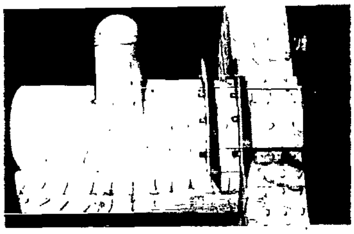
$\alpha = 20^\circ$



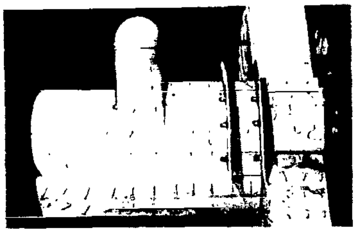
$\alpha = 25^\circ$



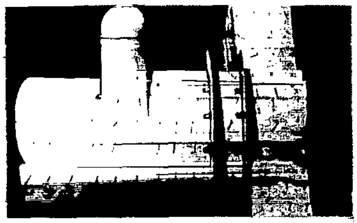
$\alpha = 30^\circ$



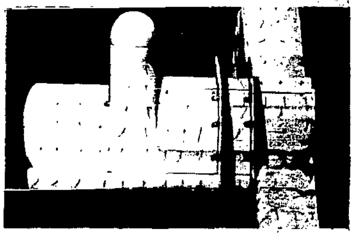
$\alpha = 35^\circ$



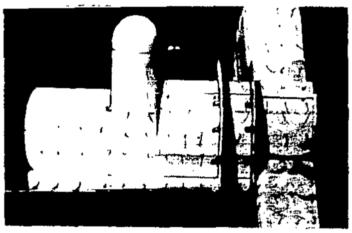
$\alpha = 40^\circ$



$\alpha = 45^\circ$



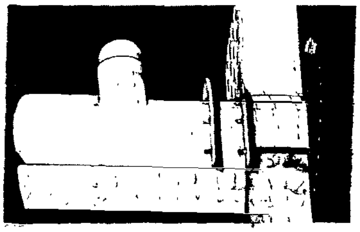
$\alpha = 50^\circ$



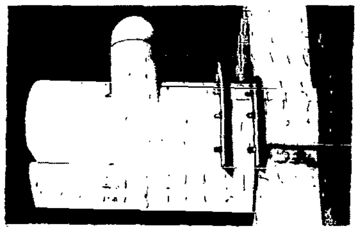
$\alpha = 55^\circ$

(d) Flow characteristics; $C_{T,s} = 0.60$.

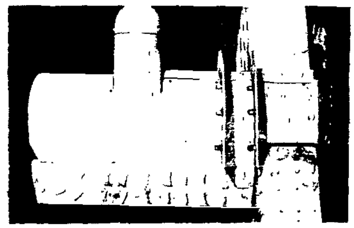
Figure 31.- Continued.



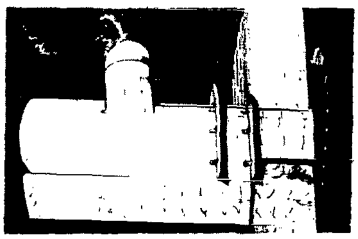
$\alpha = 5^\circ$



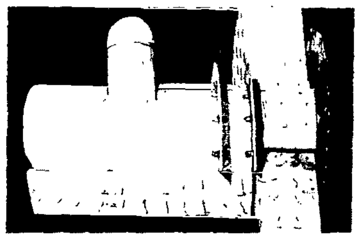
$\alpha = 20^\circ$



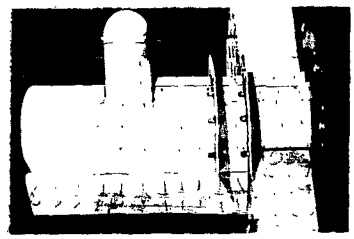
$\alpha = 35^\circ$



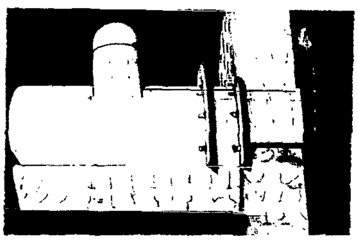
$\alpha = 10^\circ$



$\alpha = 25^\circ$

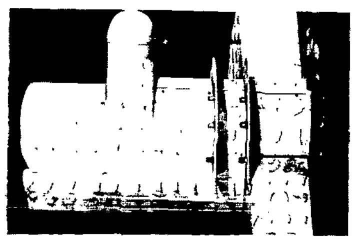


$\alpha = 40^\circ$



$\alpha = 15^\circ$

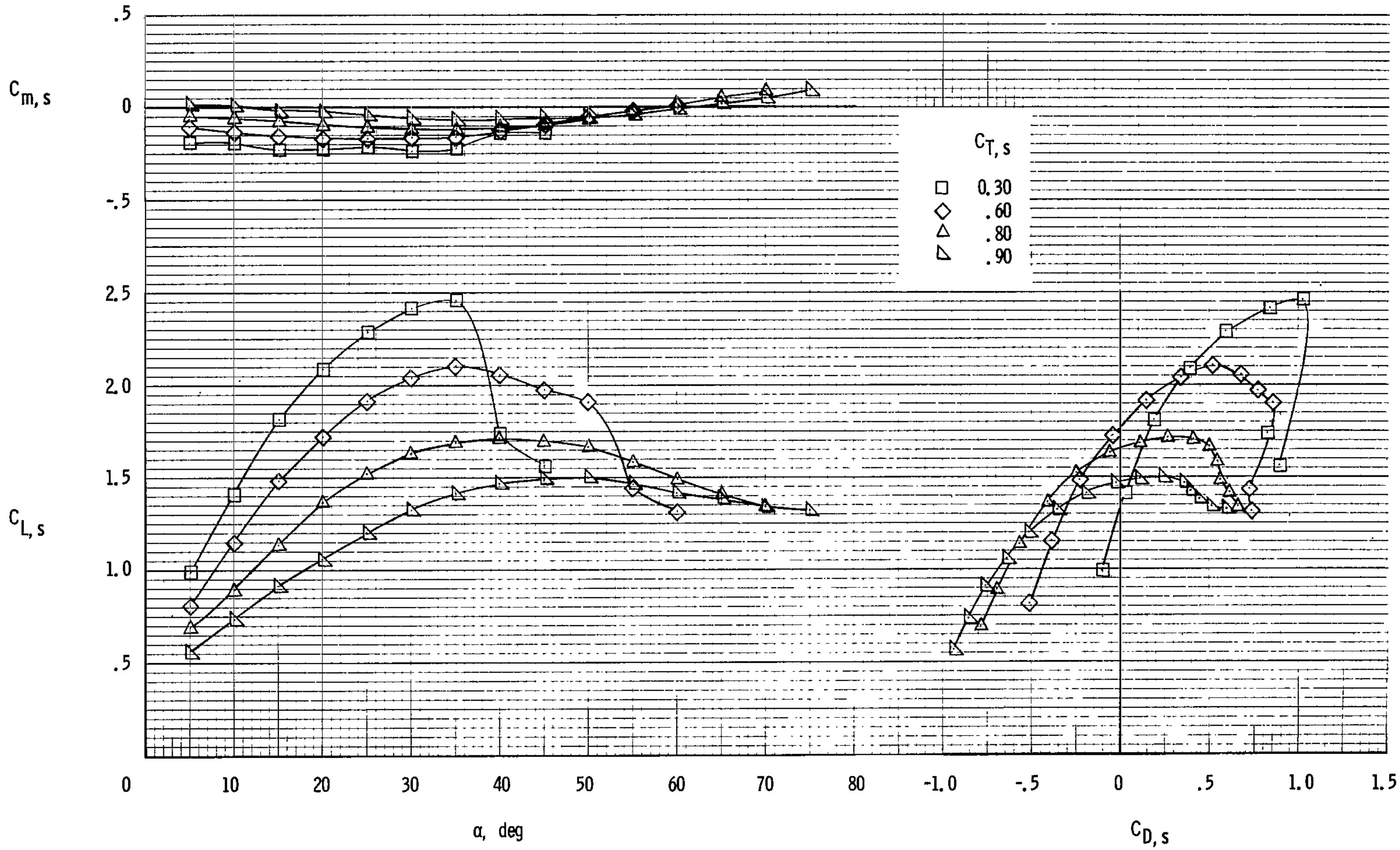
$\alpha = 30^\circ$



$\alpha = 45^\circ$

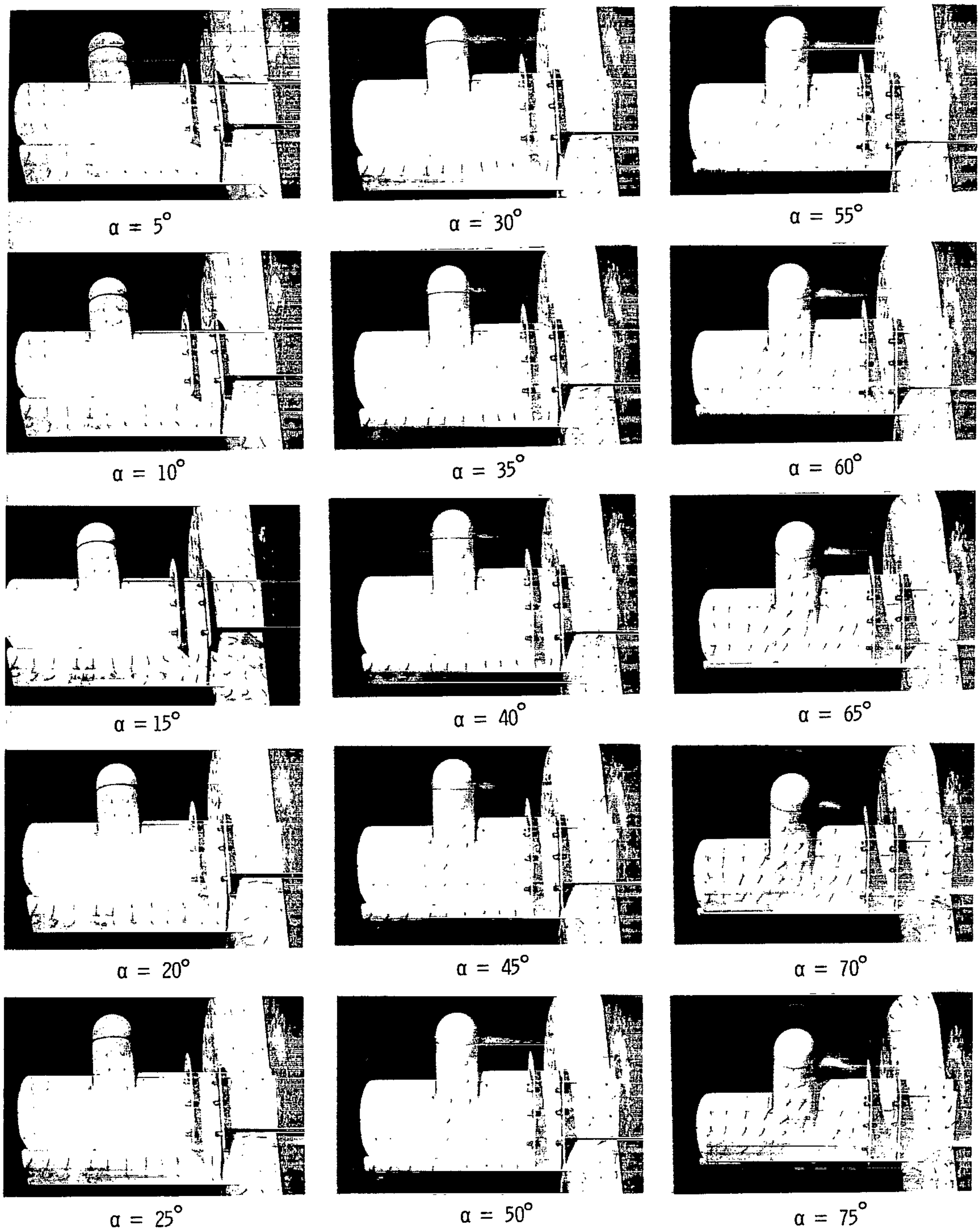
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 31.- Concluded.



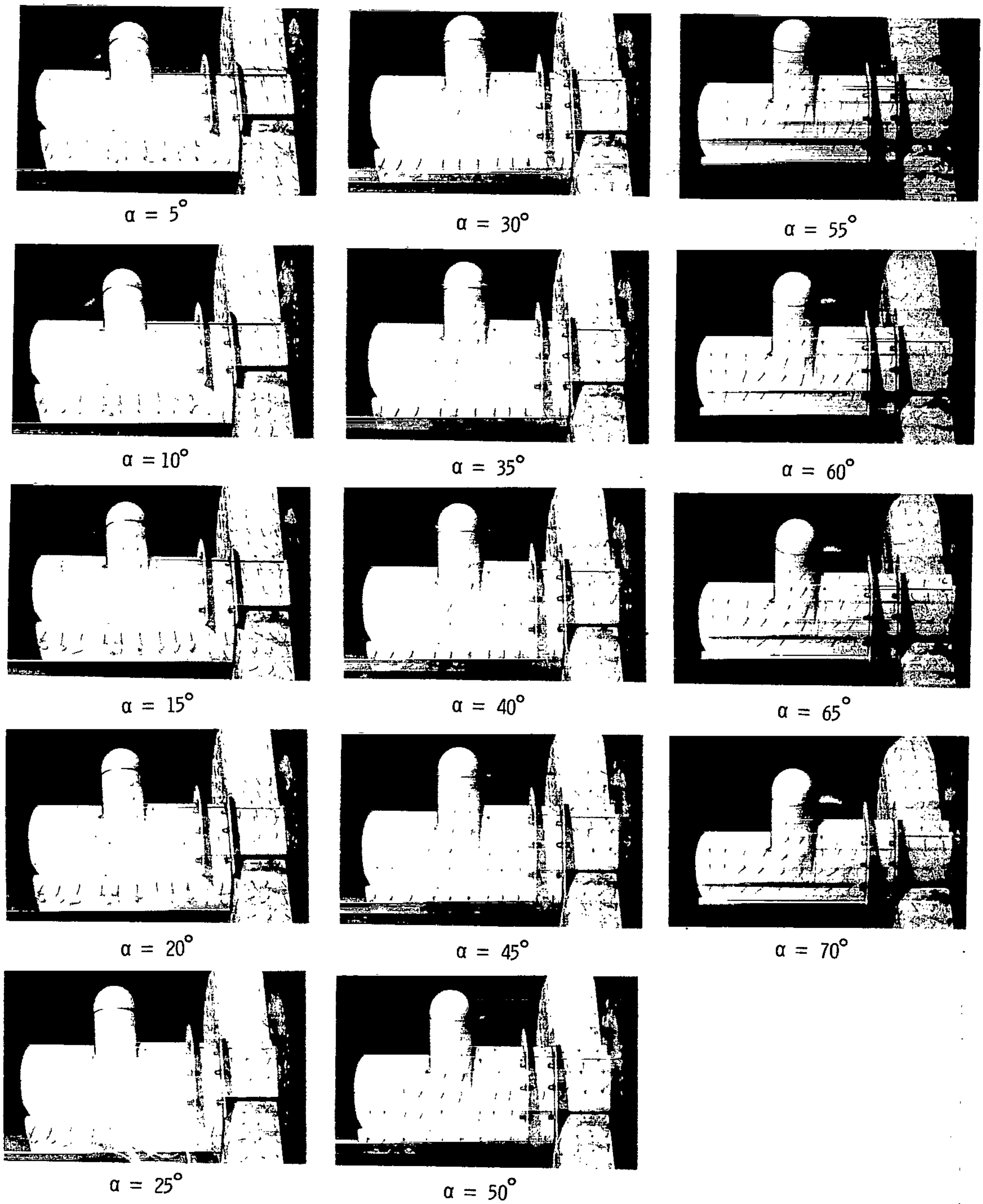
(a) Aerodynamic characteristics.

Figure 32.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Inboard slat on; fences on; $\delta_f = 40^0$.



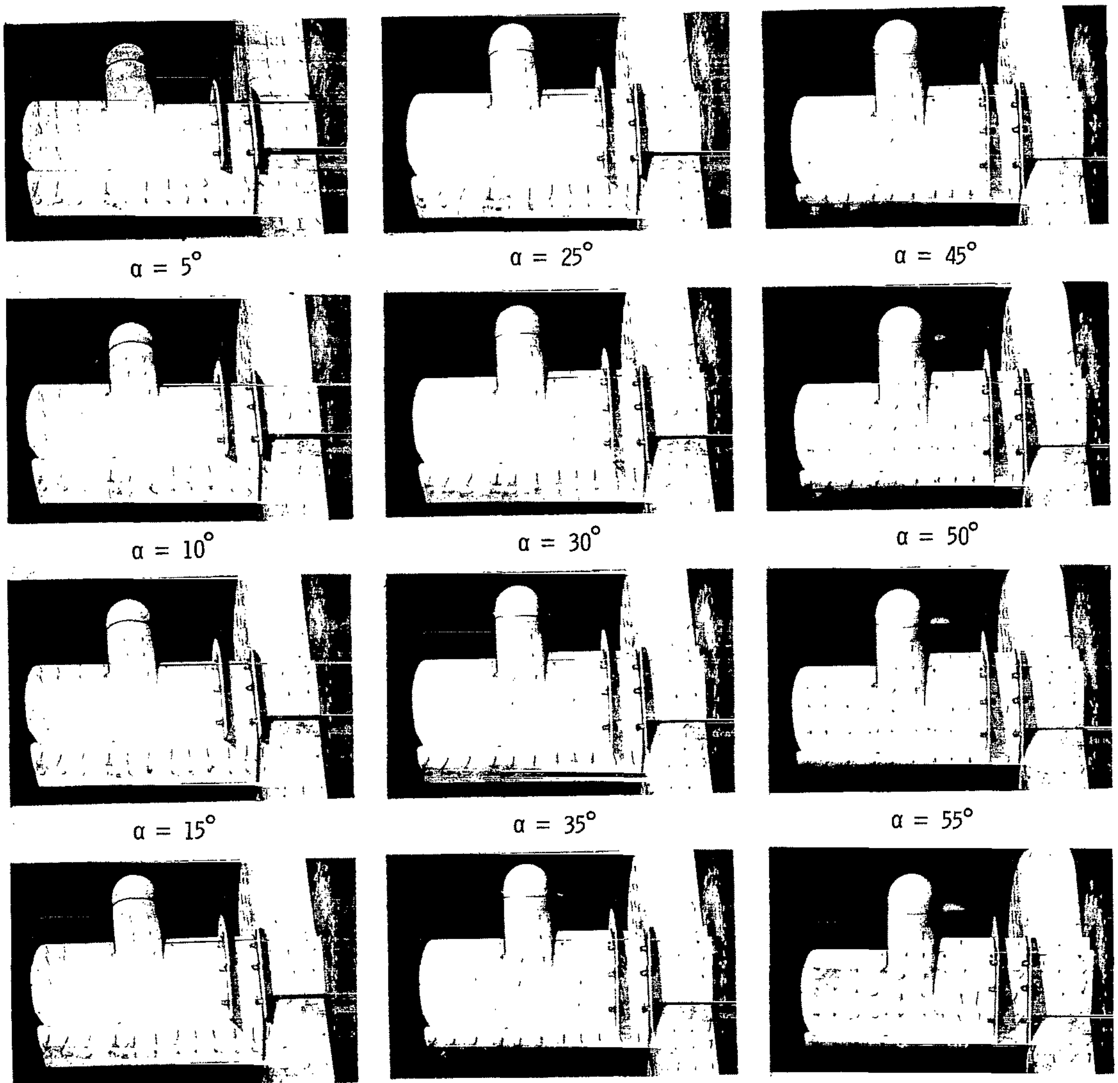
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 32.- Continued.



(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 32.- Continued.



$\alpha = 5^\circ$ $\alpha = 25^\circ$ $\alpha = 45^\circ$

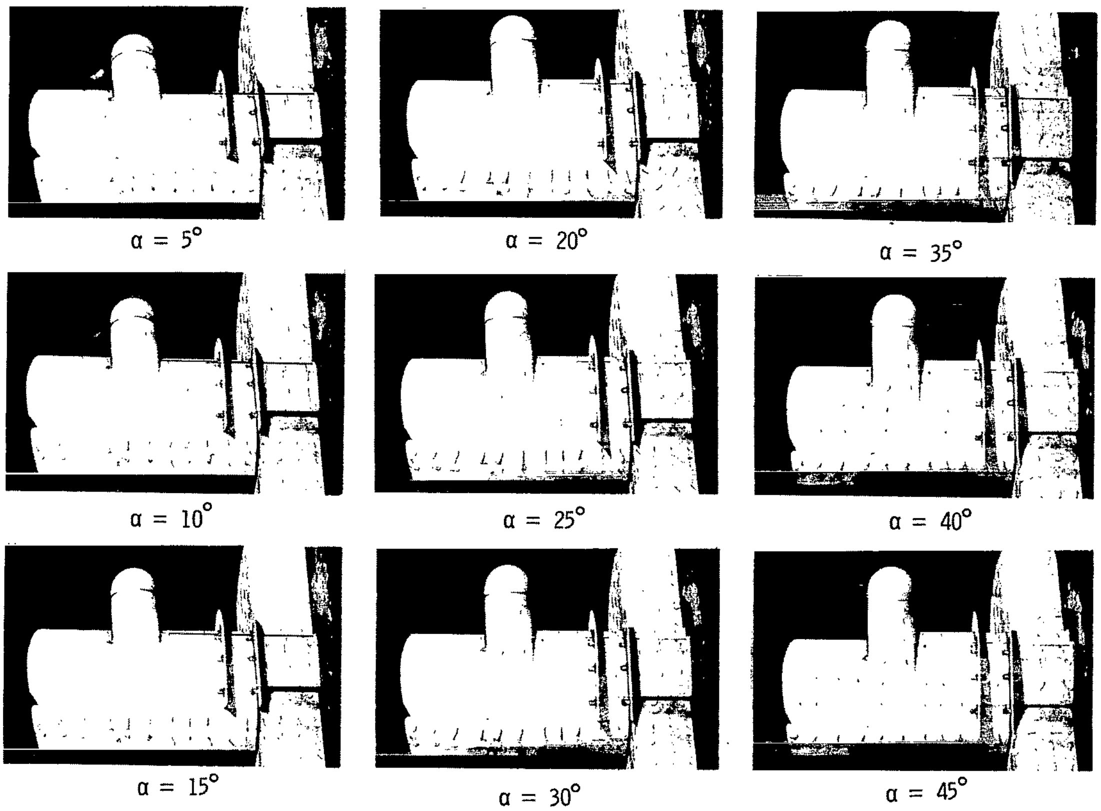
$\alpha = 10^\circ$ $\alpha = 30^\circ$ $\alpha = 50^\circ$

$\alpha = 15^\circ$ $\alpha = 35^\circ$ $\alpha = 55^\circ$

$\alpha = 20^\circ$ $\alpha = 40^\circ$ $\alpha = 60^\circ$

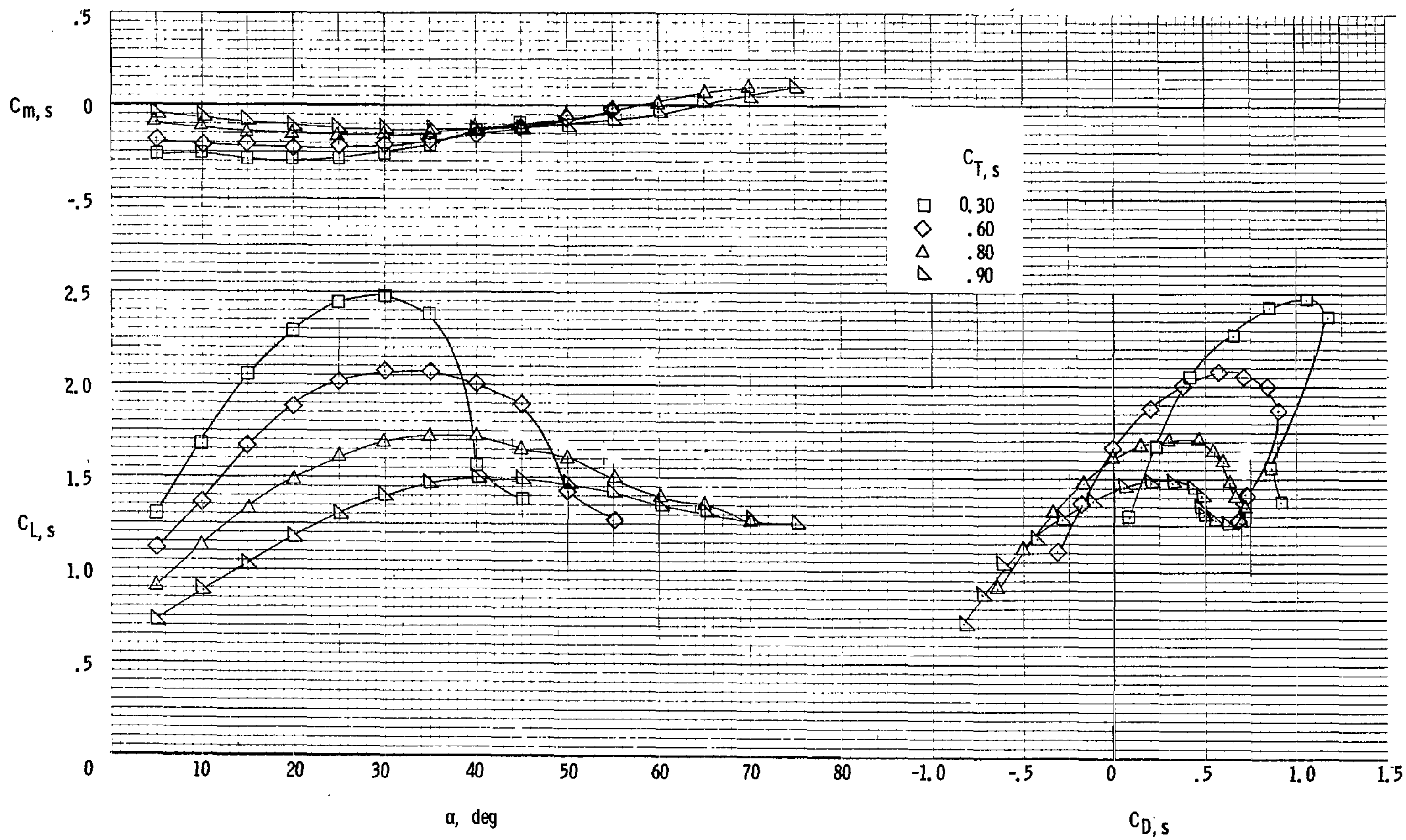
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 32.- Continued.



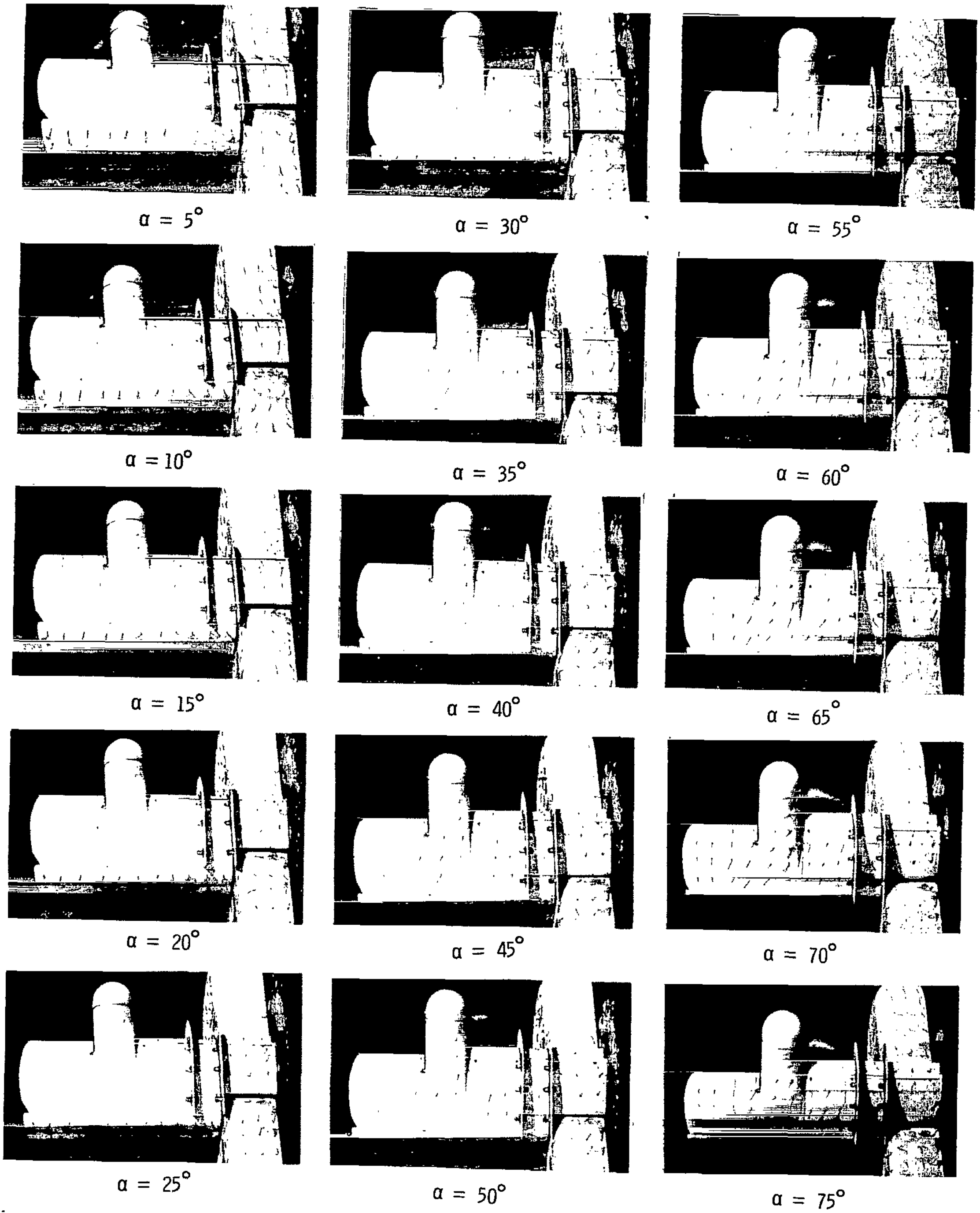
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 32.- Concluded.



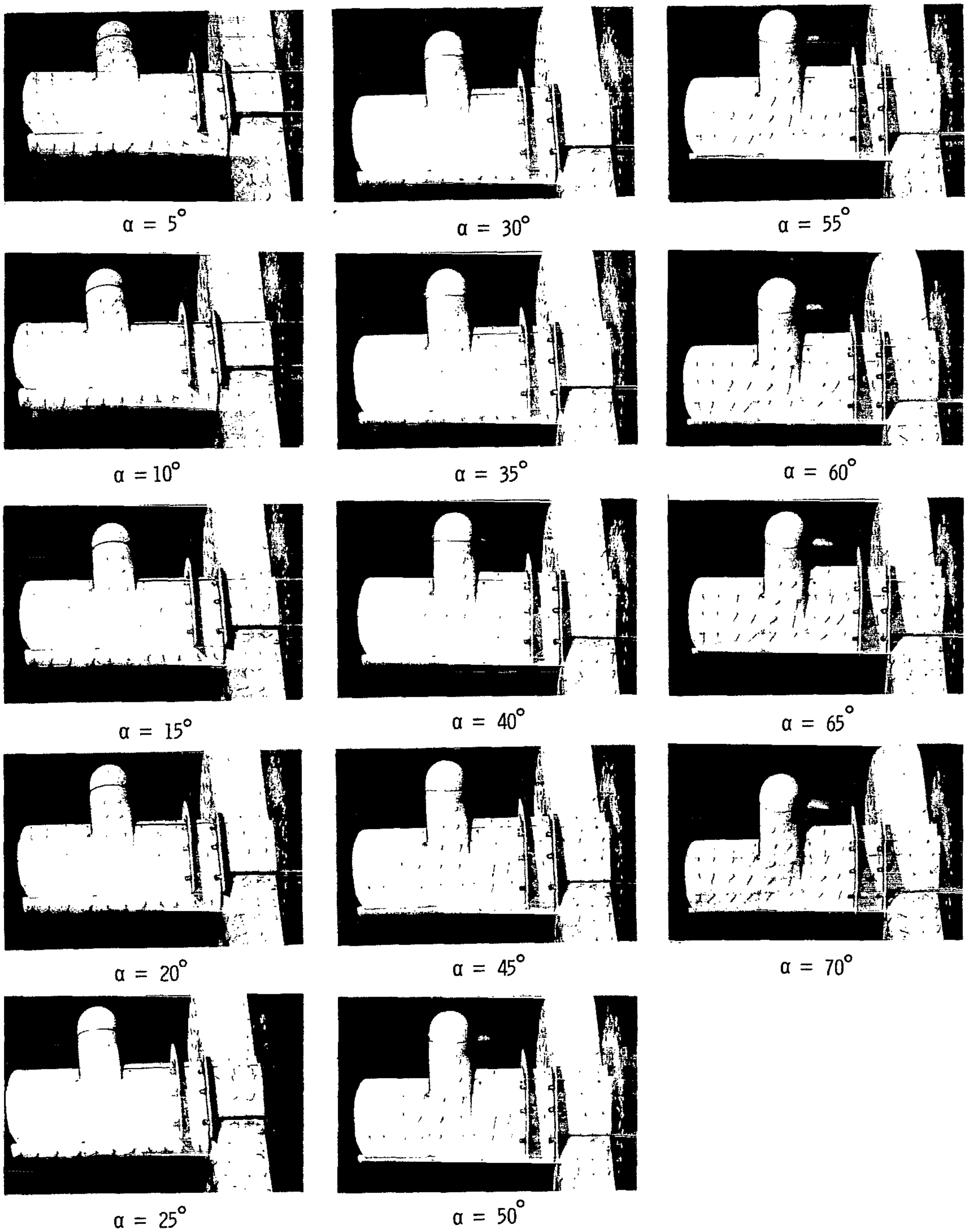
(a) Aerodynamic characteristics.

Figure 33.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Inboard slat on; fences on; $\delta_f = 60^{\circ}$.



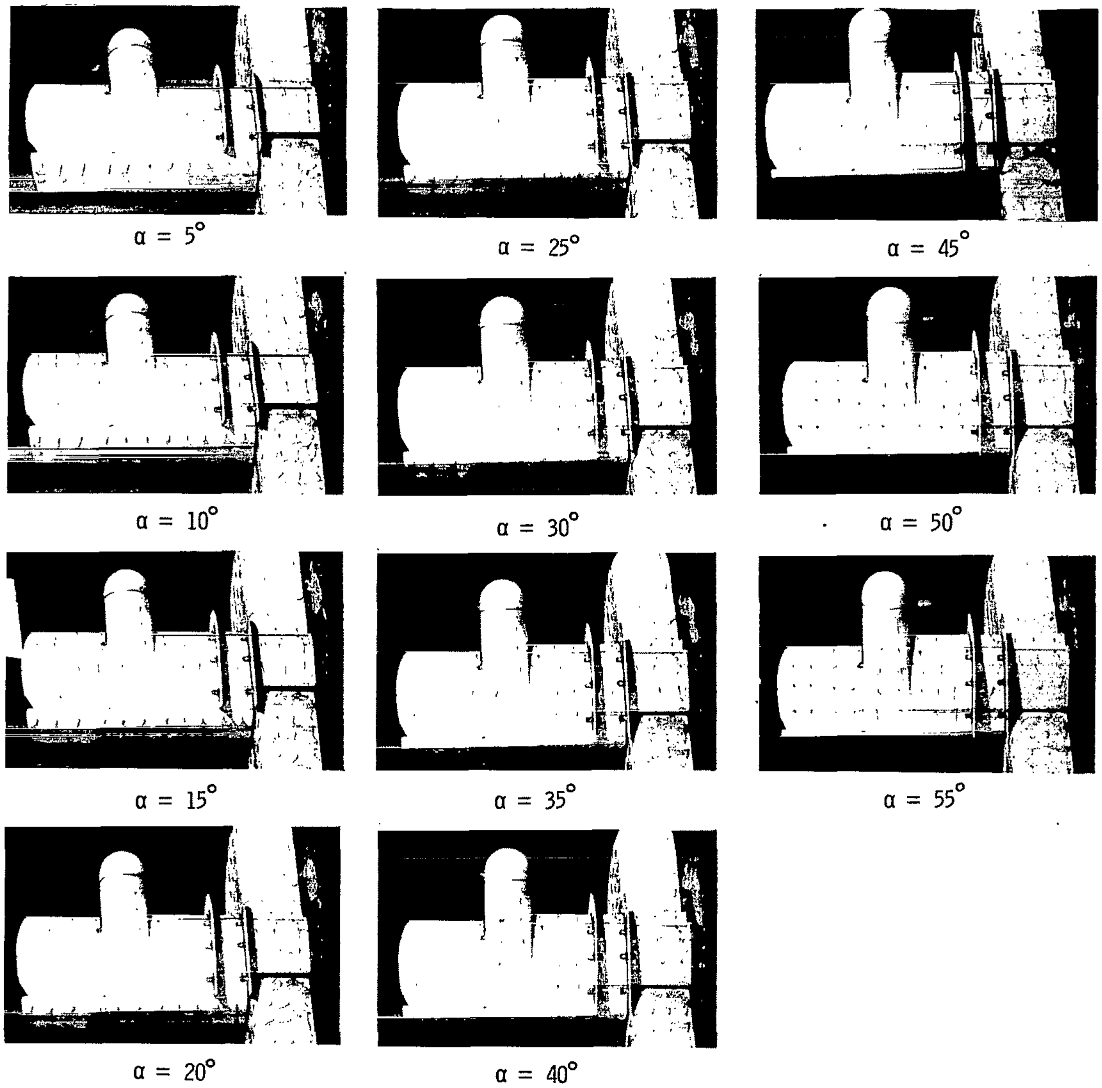
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 33.- Continued.



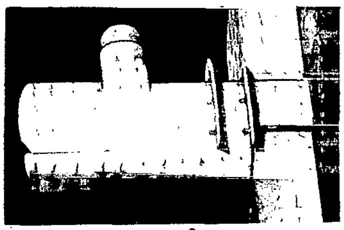
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 33.- Continued.

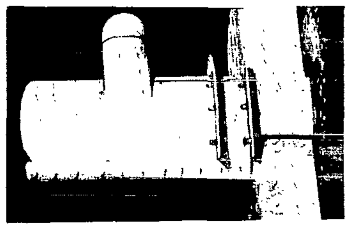


(d) Flow characteristics; $C_{T,s} = 0.60$.

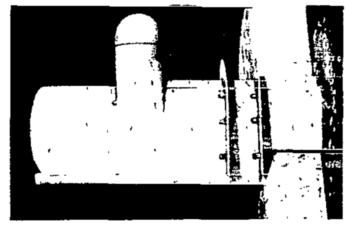
Figure 33.- Continued.



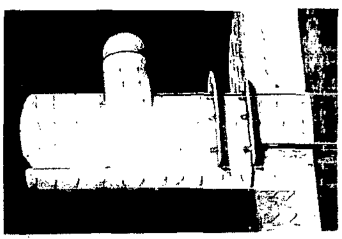
$\alpha = 5^\circ$



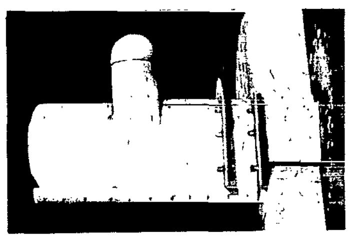
$\alpha = 20^\circ$



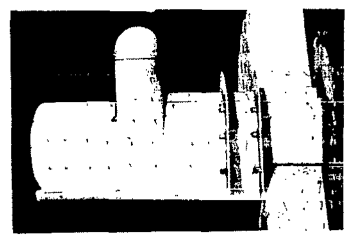
$\alpha = 35^\circ$



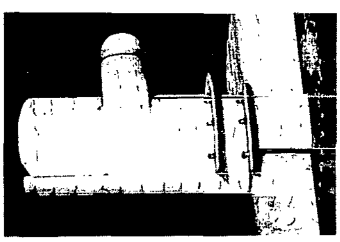
$\alpha = 10^\circ$



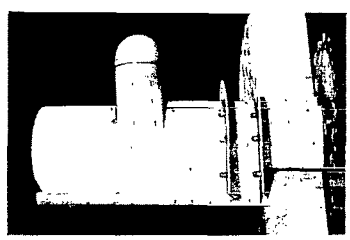
$\alpha = 25^\circ$



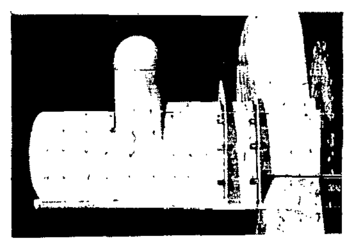
$\alpha = 40^\circ$



$\alpha = 15^\circ$



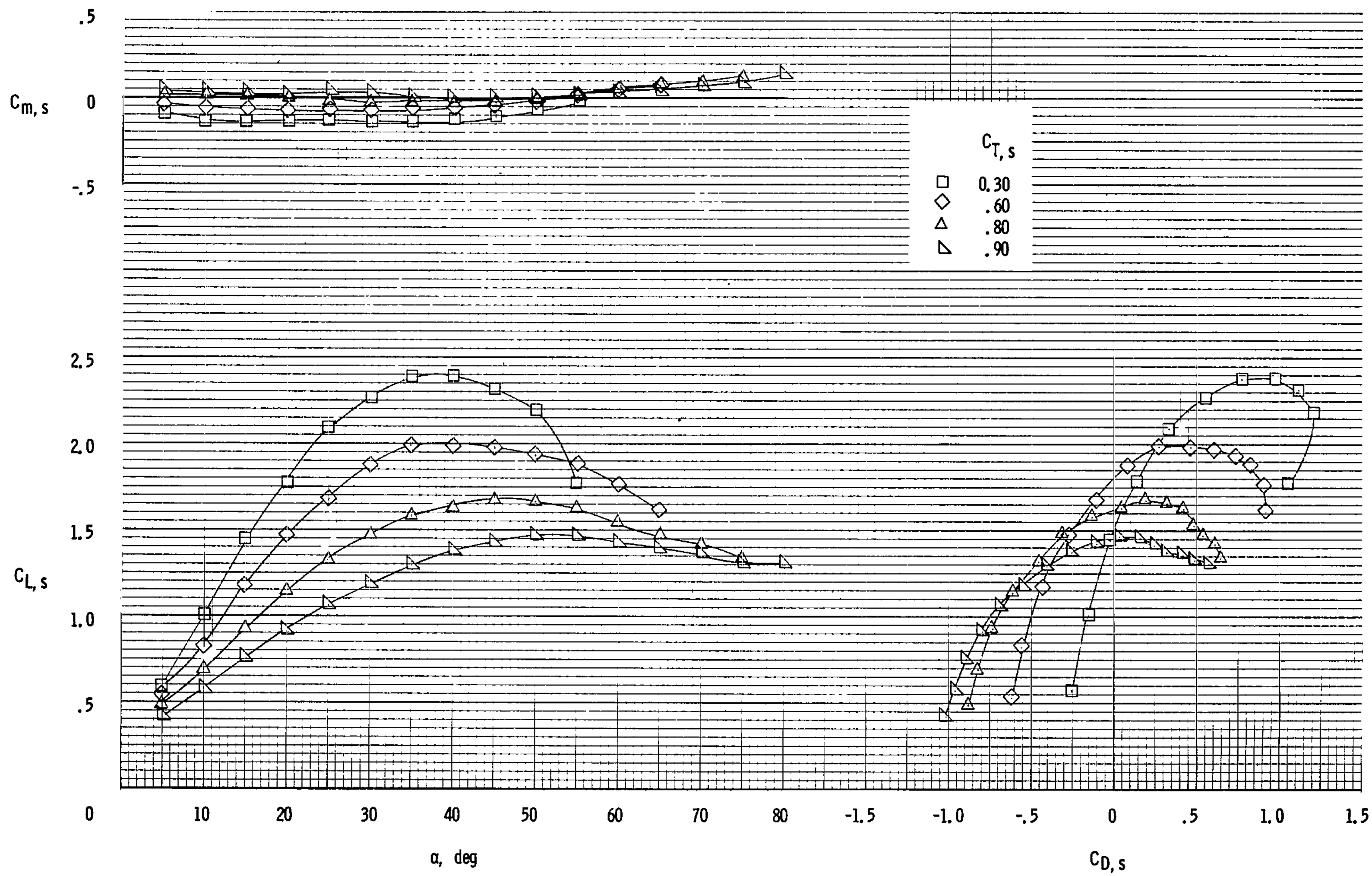
$\alpha = 30^\circ$



$\alpha = 45^\circ$

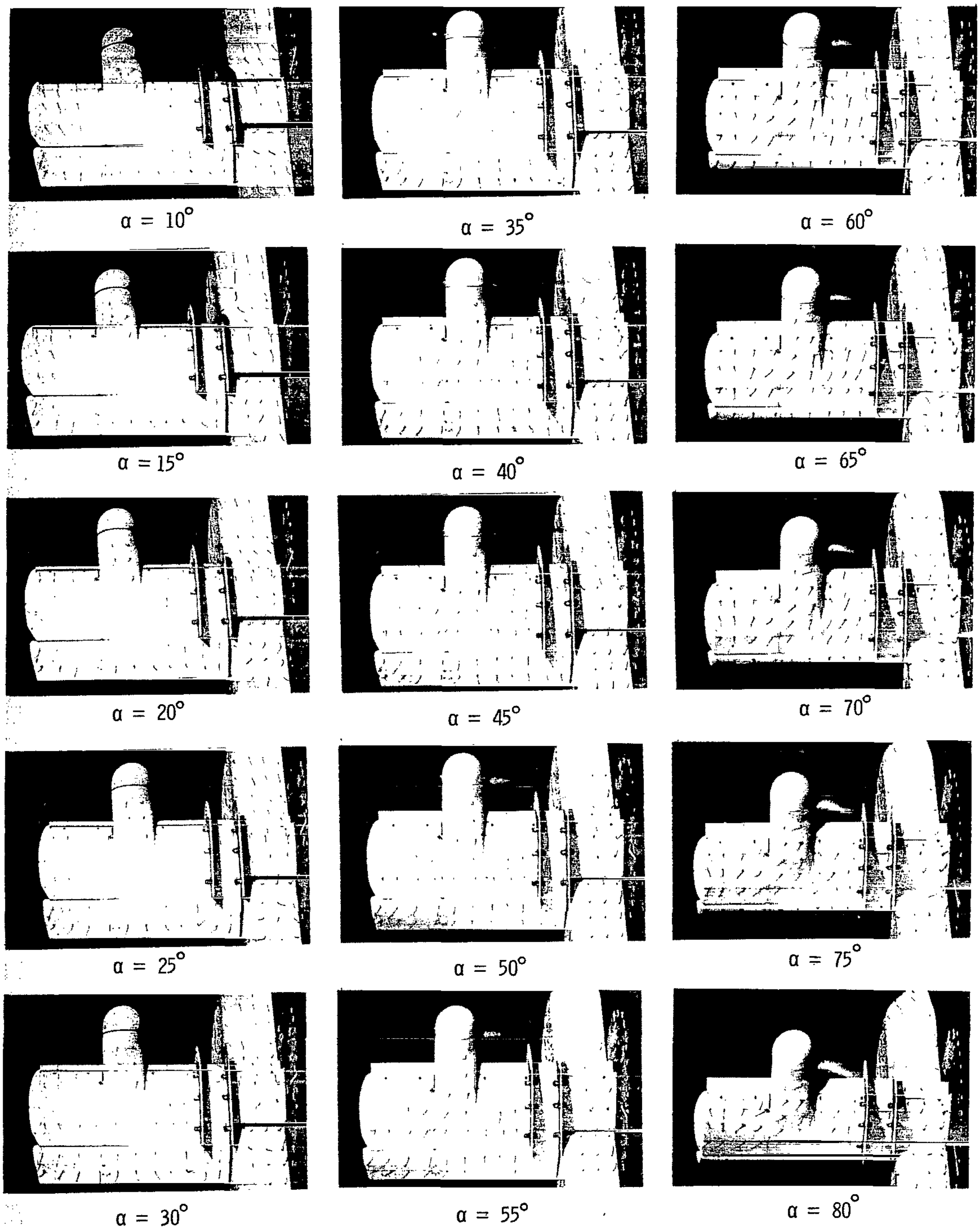
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 33.- Concluded.



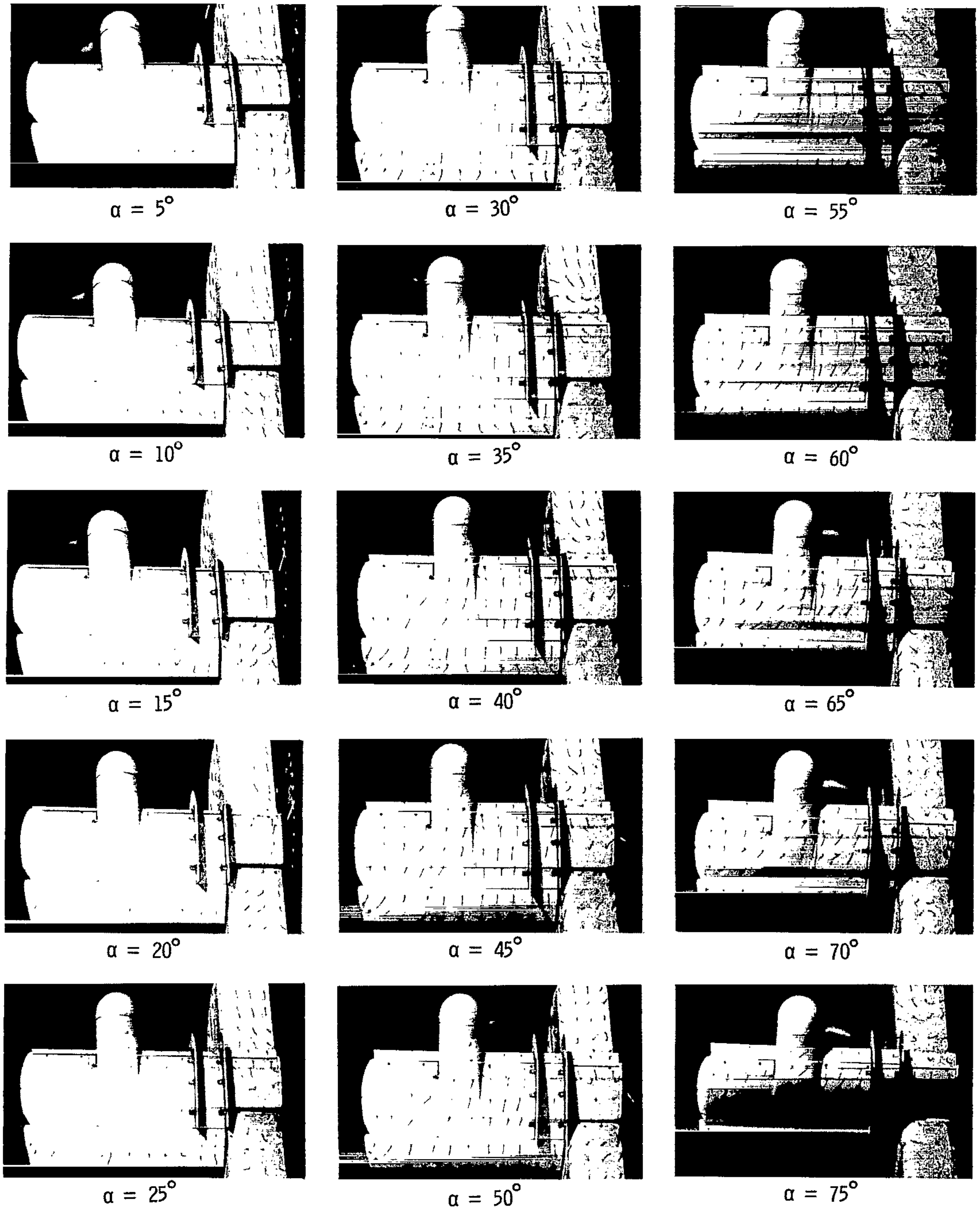
(a) Aerodynamic characteristics.

Figure 34.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Full-span slat on; fences on; $\delta_f = 20^0$.



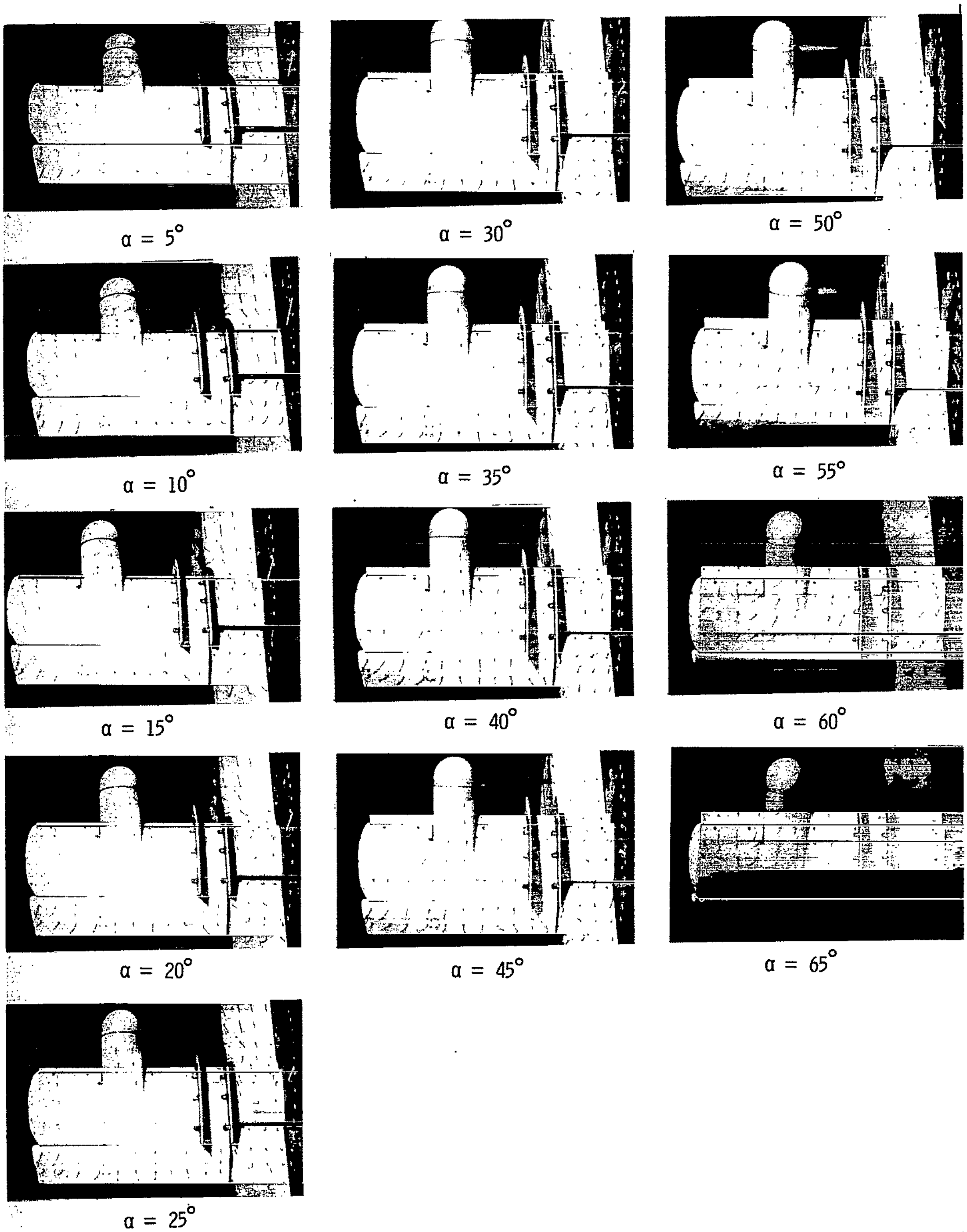
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 34.- Continued.



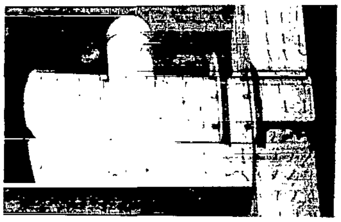
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 34.- Continued.

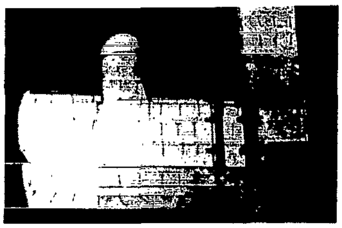


(d) Flow characteristics; $C_{T,s} = 0.60$.

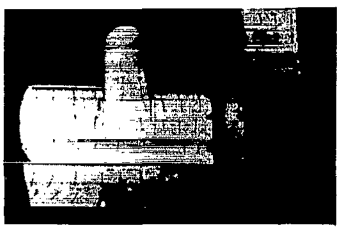
Figure 34.- Continued.



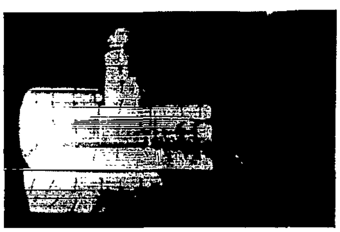
$\alpha = 5°$



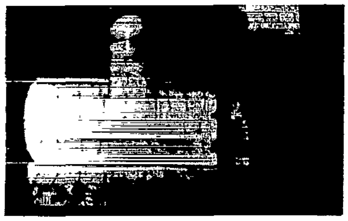
$\alpha = 10°$



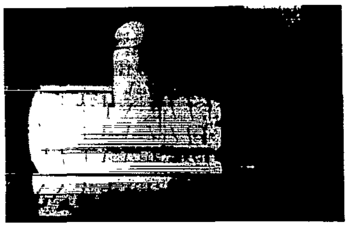
$\alpha = 15°$



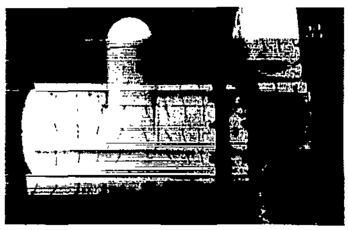
$\alpha = 20°$



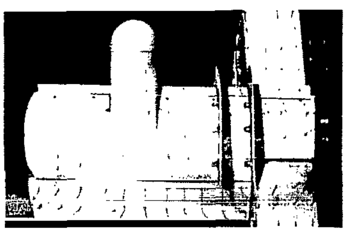
$\alpha = 25°$



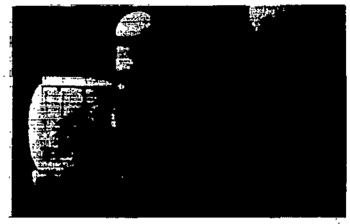
$\alpha = 30°$



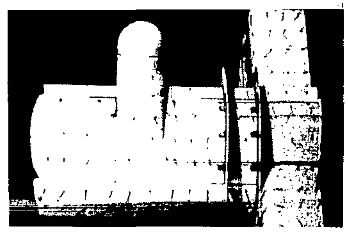
$\alpha = 35°$



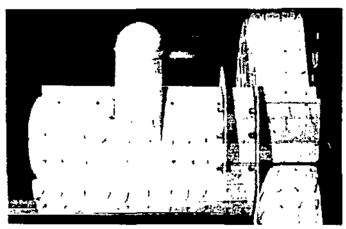
$\alpha = 40°$



$\alpha = 45°$



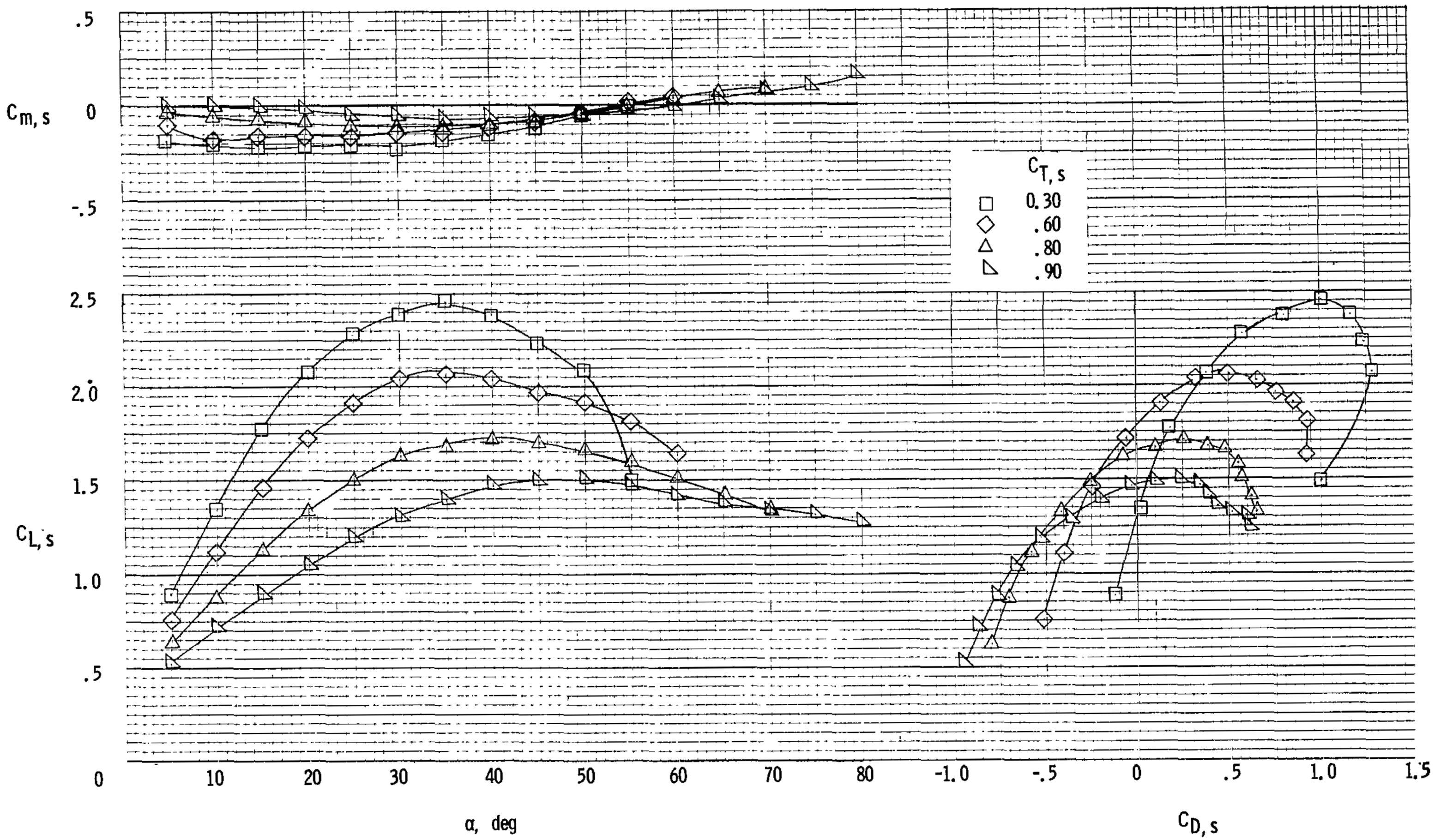
$\alpha = 50°$



$\alpha = 55°$

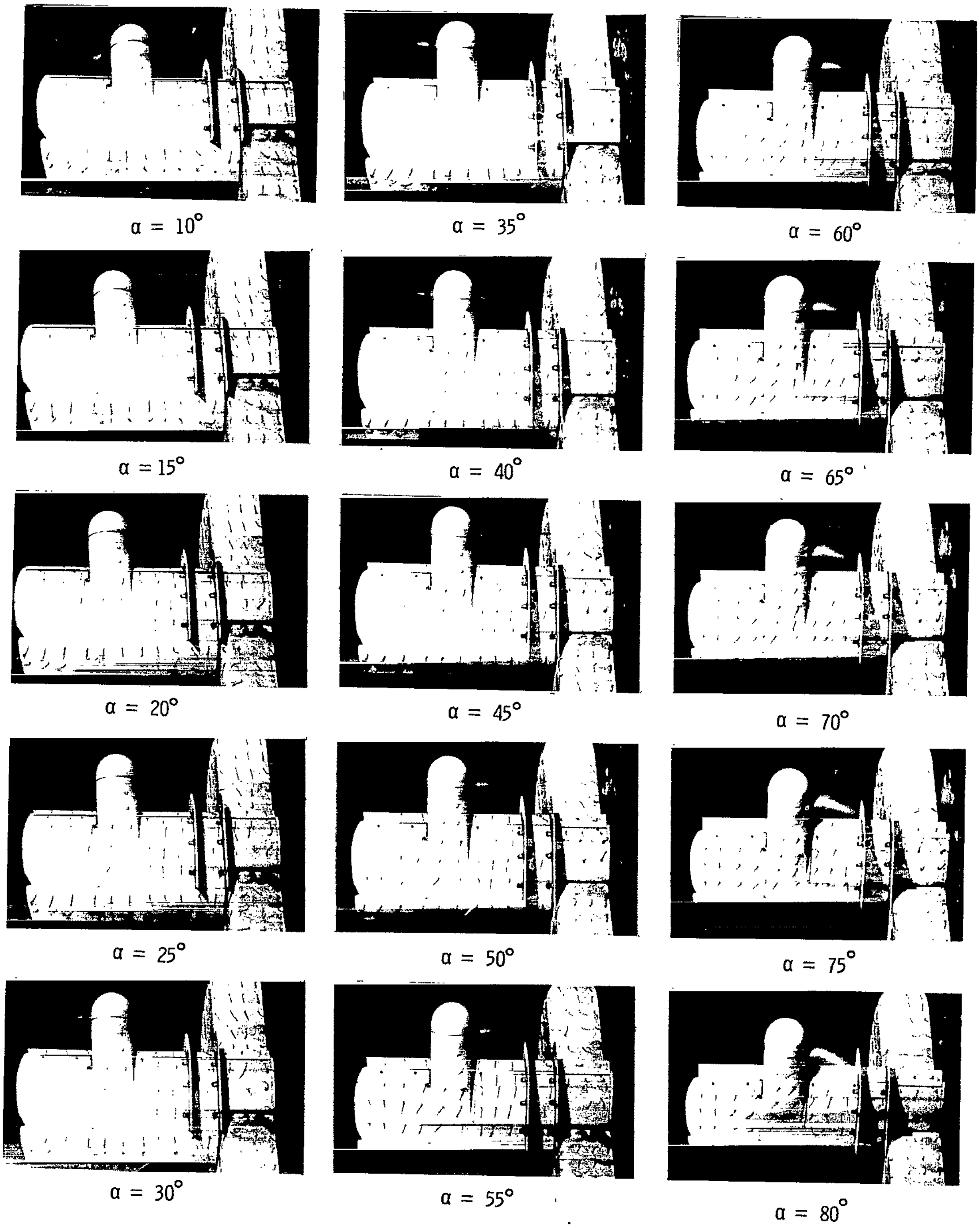
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 34.- Concluded.



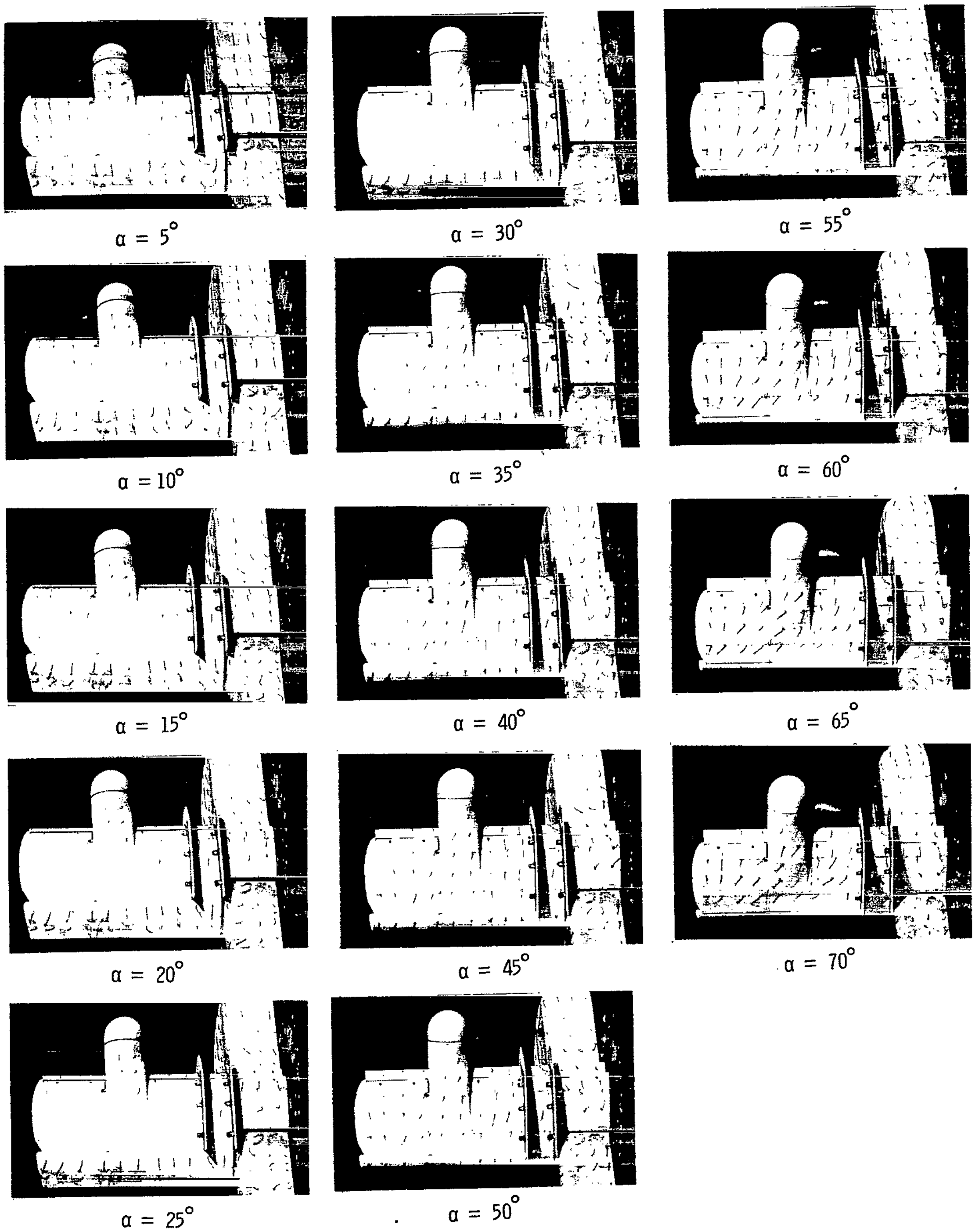
(a) Aerodynamic characteristics.

Figure 35.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Full-span slat on; fences on; $\delta_f = 40^{\circ}$.



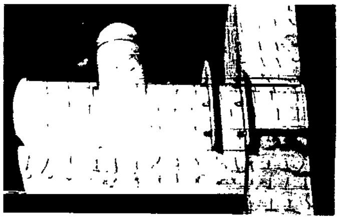
(b) Flow characteristics; $C_{T,s}$ = 0.90.

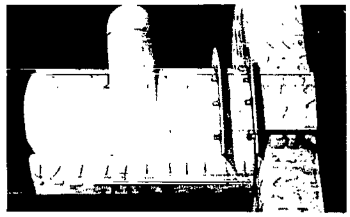
Figure 35.- Continued.



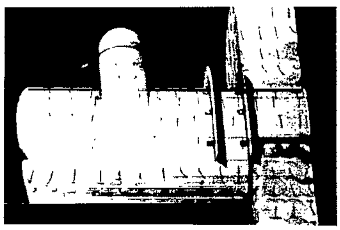
(c) Flow characteristics; $C_{T,s} = 0.80$.

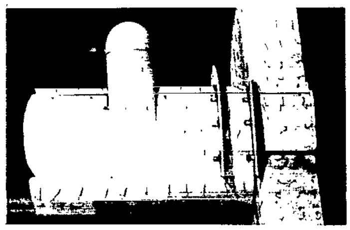
Figure 35.- Continued.

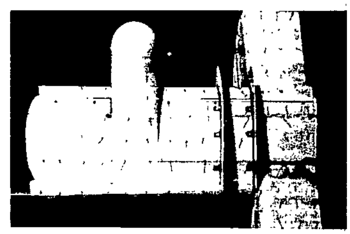

$\alpha = 5^{\circ}$

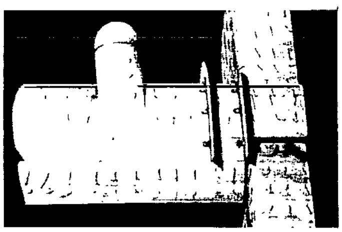

$\alpha = 25^{\circ}$

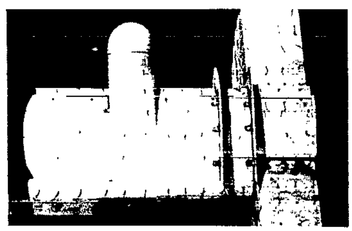

$\alpha = 45^{\circ}$

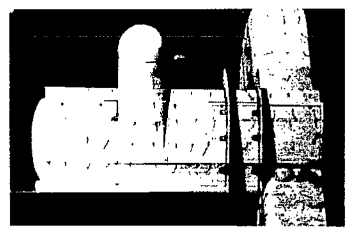

$\alpha = 10^{\circ}$

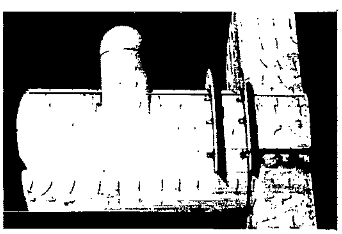

$\alpha = 30^{\circ}$

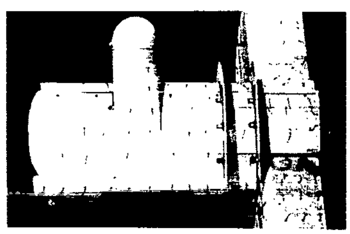

$\alpha = 50^{\circ}$


$\alpha = 15^{\circ}$


$\alpha = 35^{\circ}$


$\alpha = 55^{\circ}$

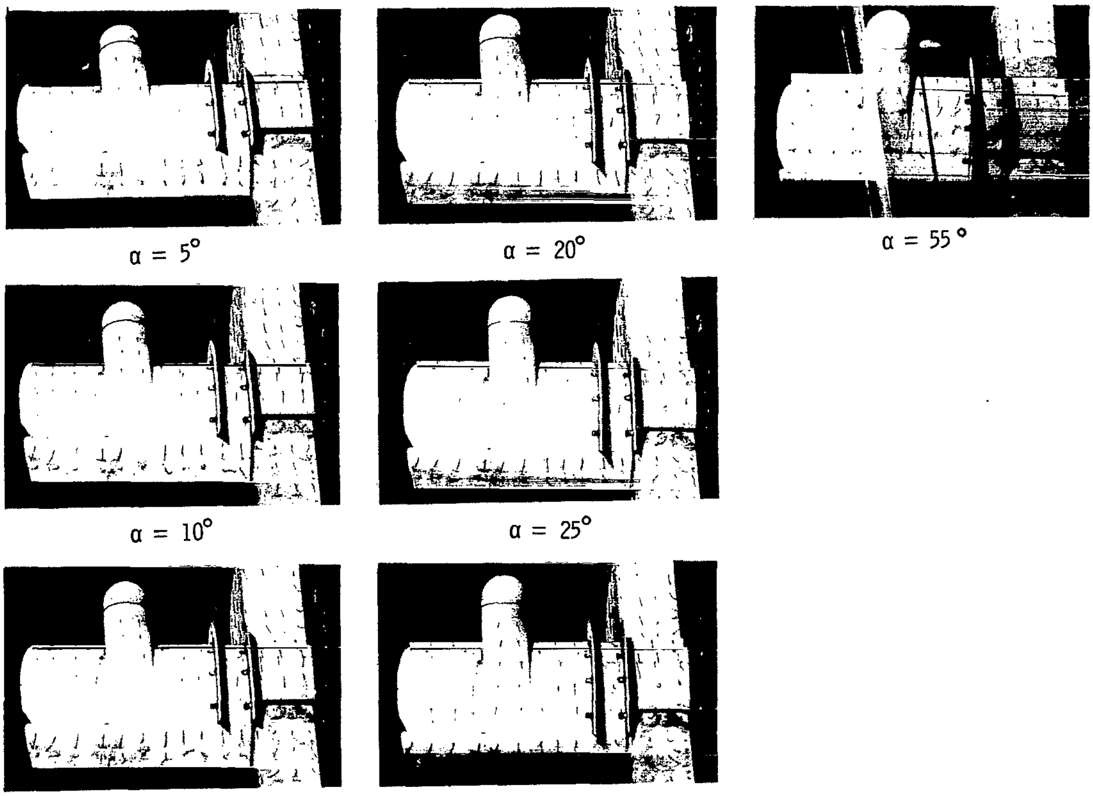

$\alpha = 20^{\circ}$


$\alpha = 40^{\circ}$


$\alpha = 60^{\circ}$

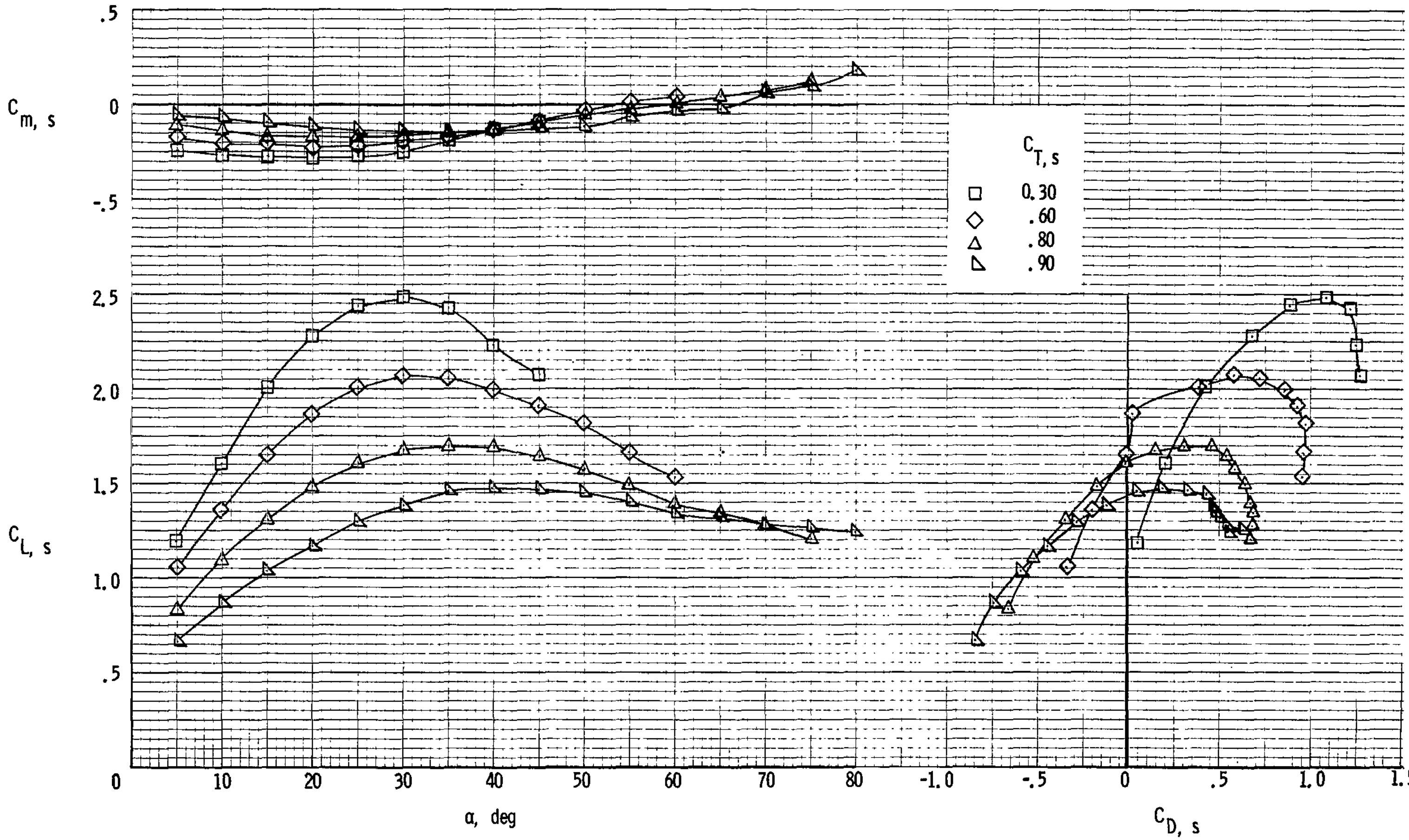
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 35.- Continued.



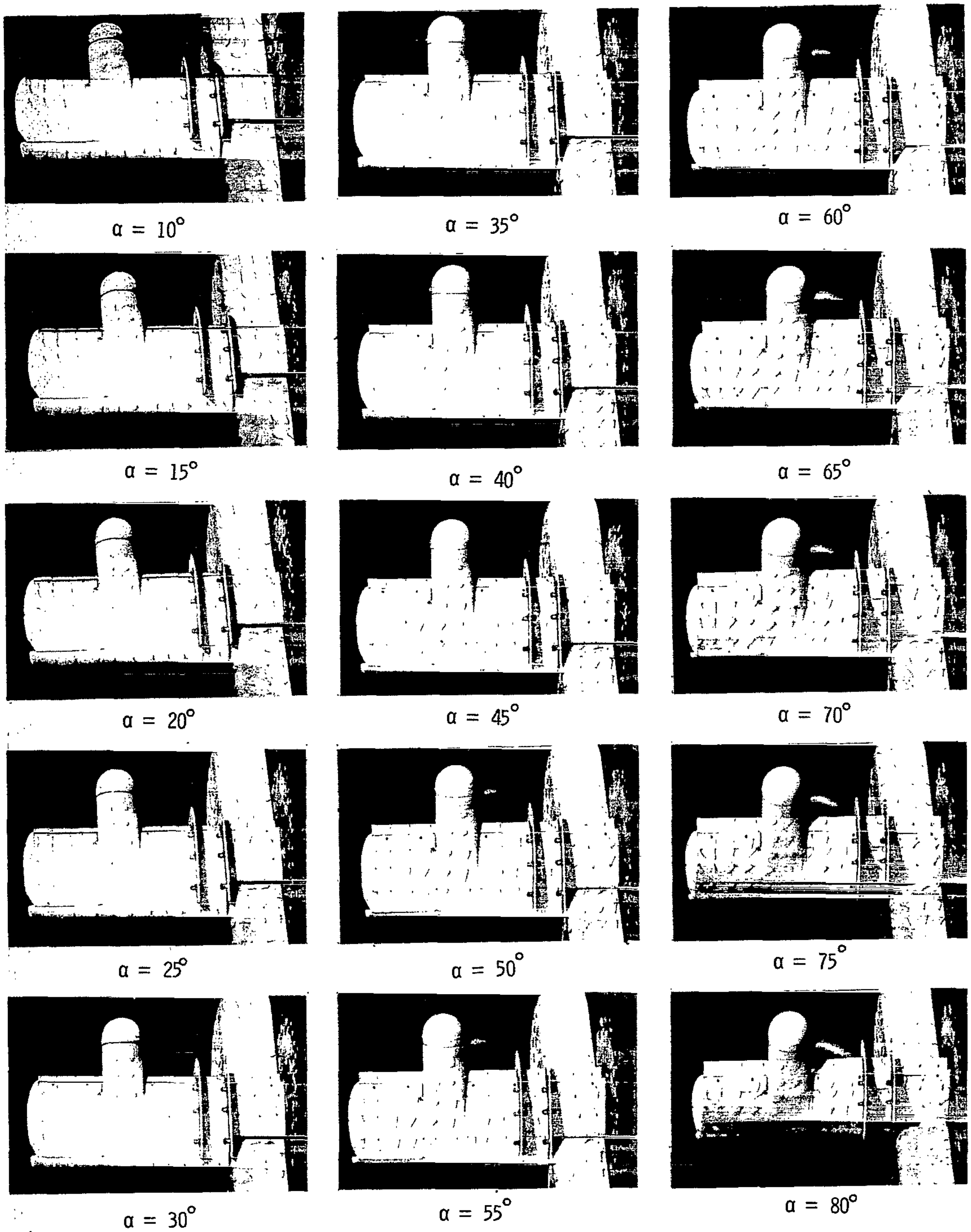
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 35.- Concluded.



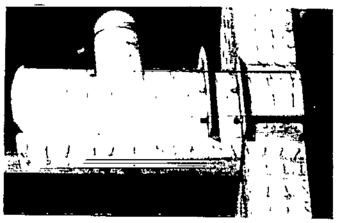
(a) Aerodynamic characteristics.

Figure 36.- Aerodynamic and flow characteristics of the wing with propeller rotation up at the tip. Full-span slat on; fences on; $\delta_f = 60^0$.

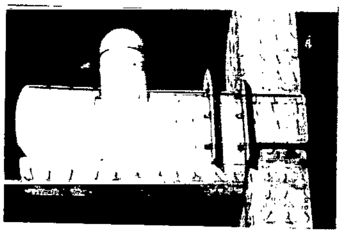


(b) Flow characteristics; $C_{T,s} = 0.90$.

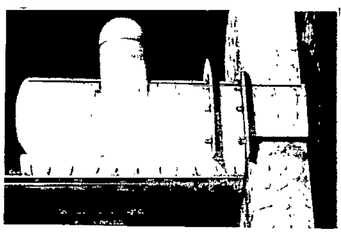
Figure 36.- Continued.



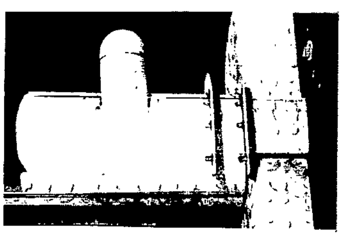
α = 5°



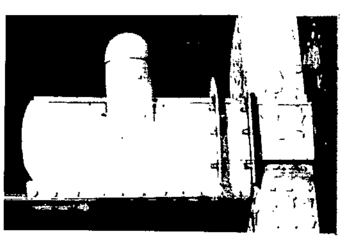
α = 10°



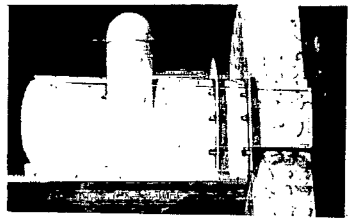
α = 15°



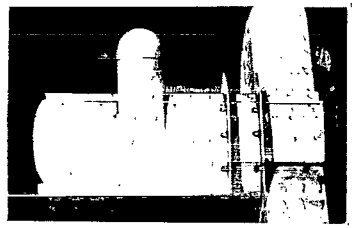
α = 20°



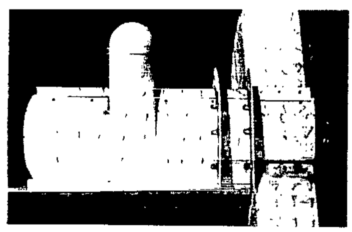
α = 25°



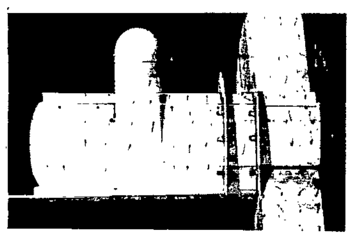
α = 30°



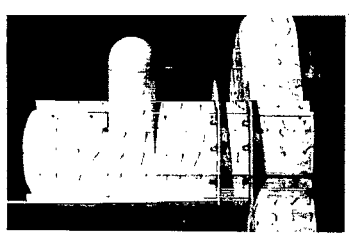
α = 35°



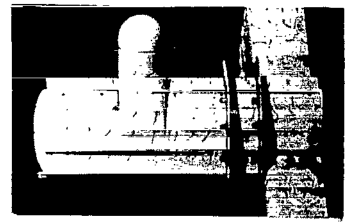
α = 40°



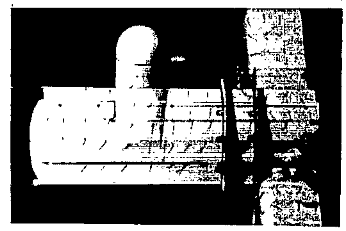
α = 45°



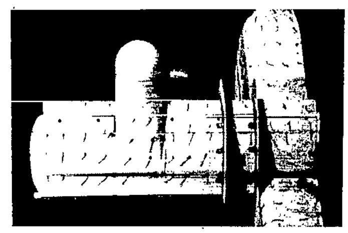
α = 50°



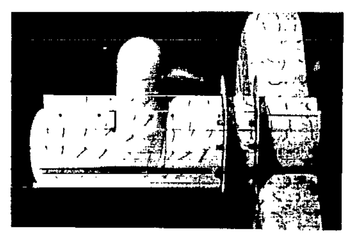
α = 55°



α = 60°



α = 65°

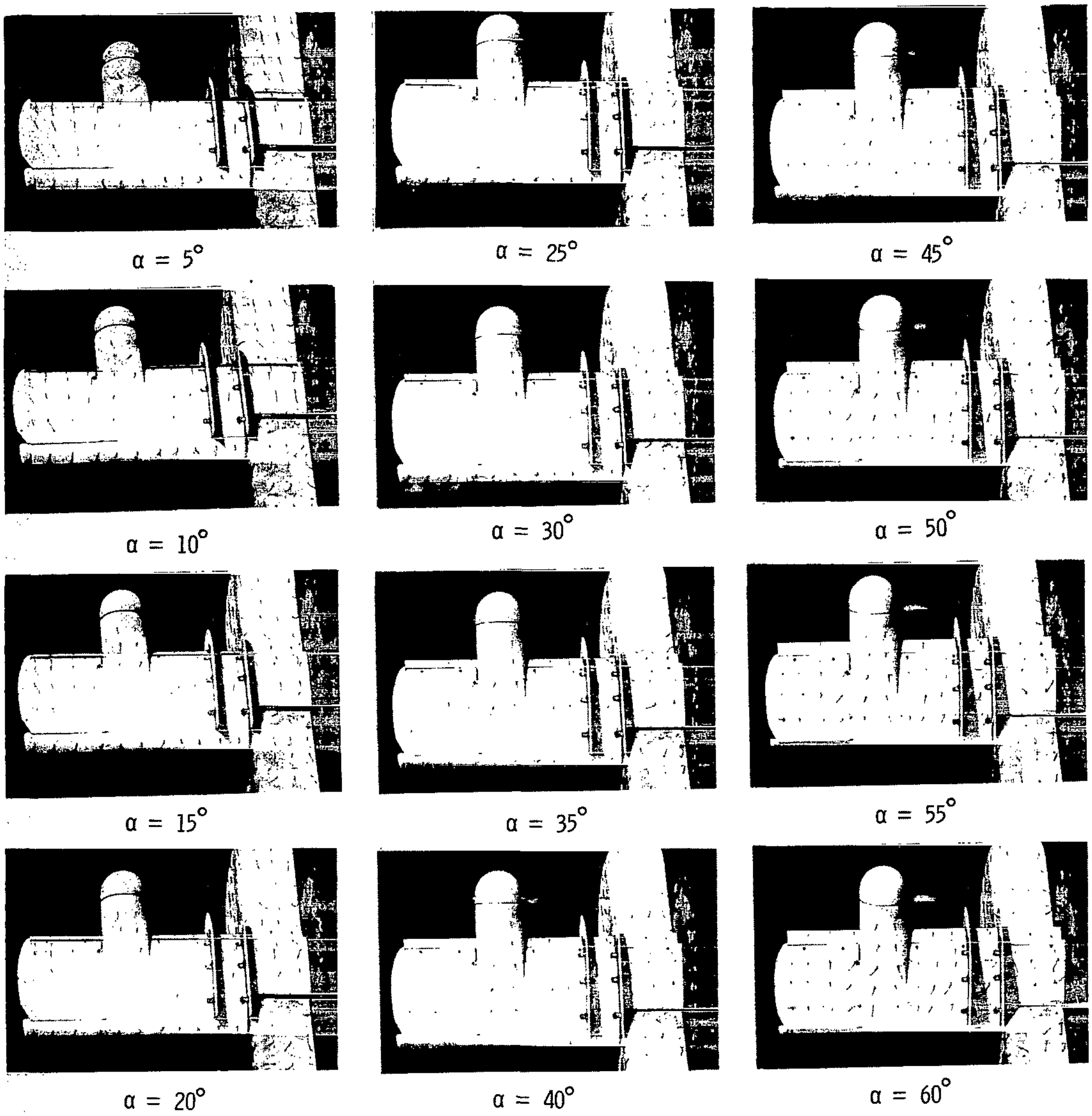


α = 70°

α = 75°

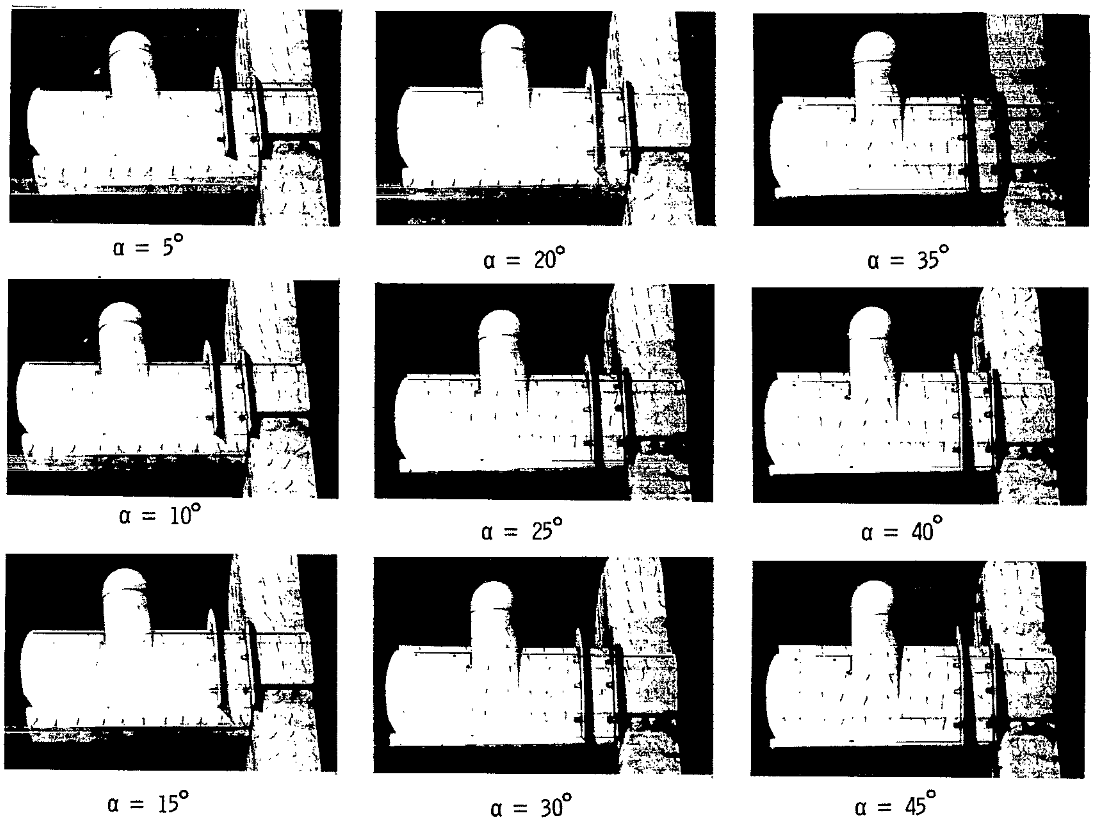
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 36.- Continued.



(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 36.- Continued.



(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 36.- Concluded.

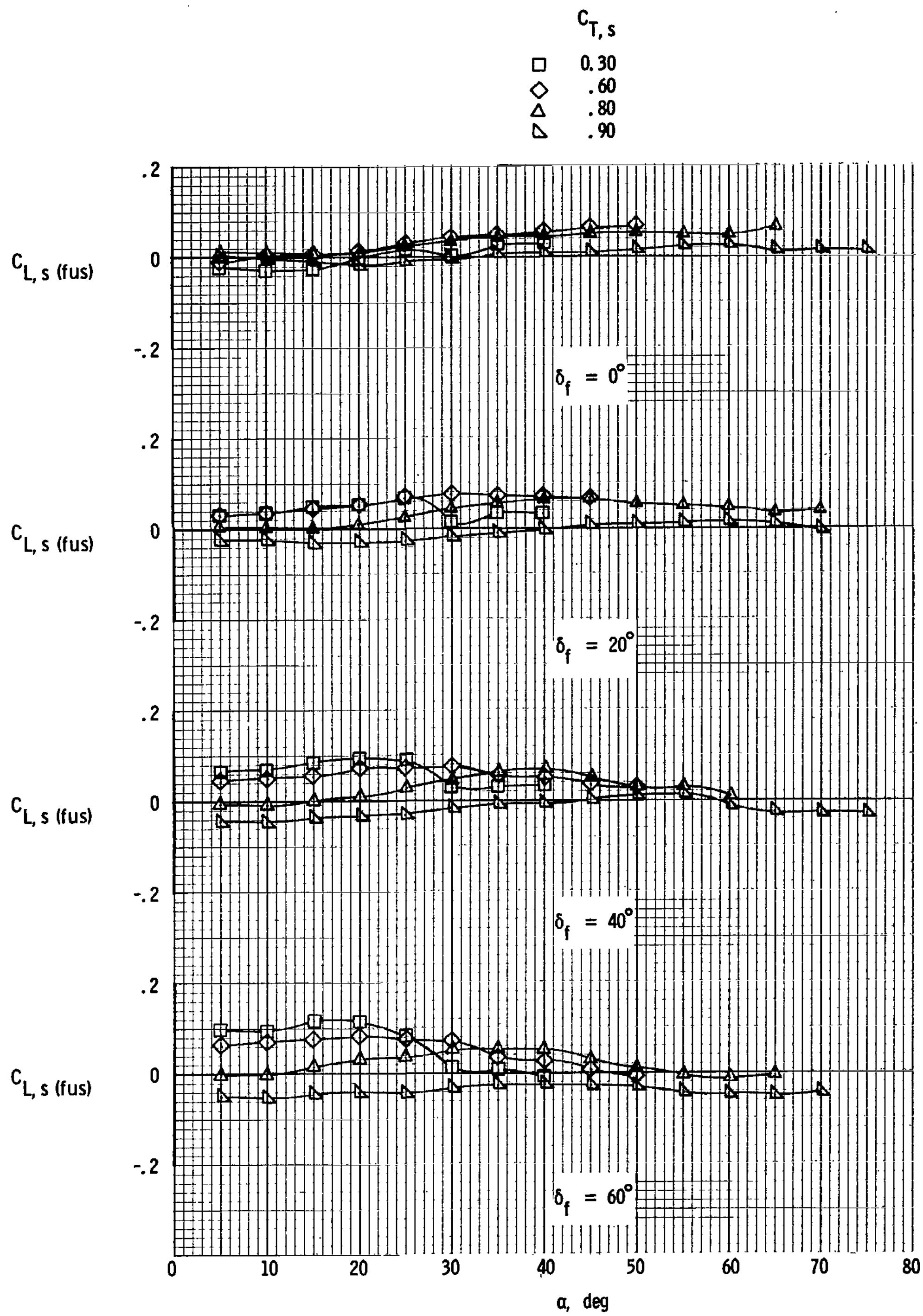


Figure 37.- Fuselage lift coefficients for down-at-the-tip rotation. Basic leading edge.

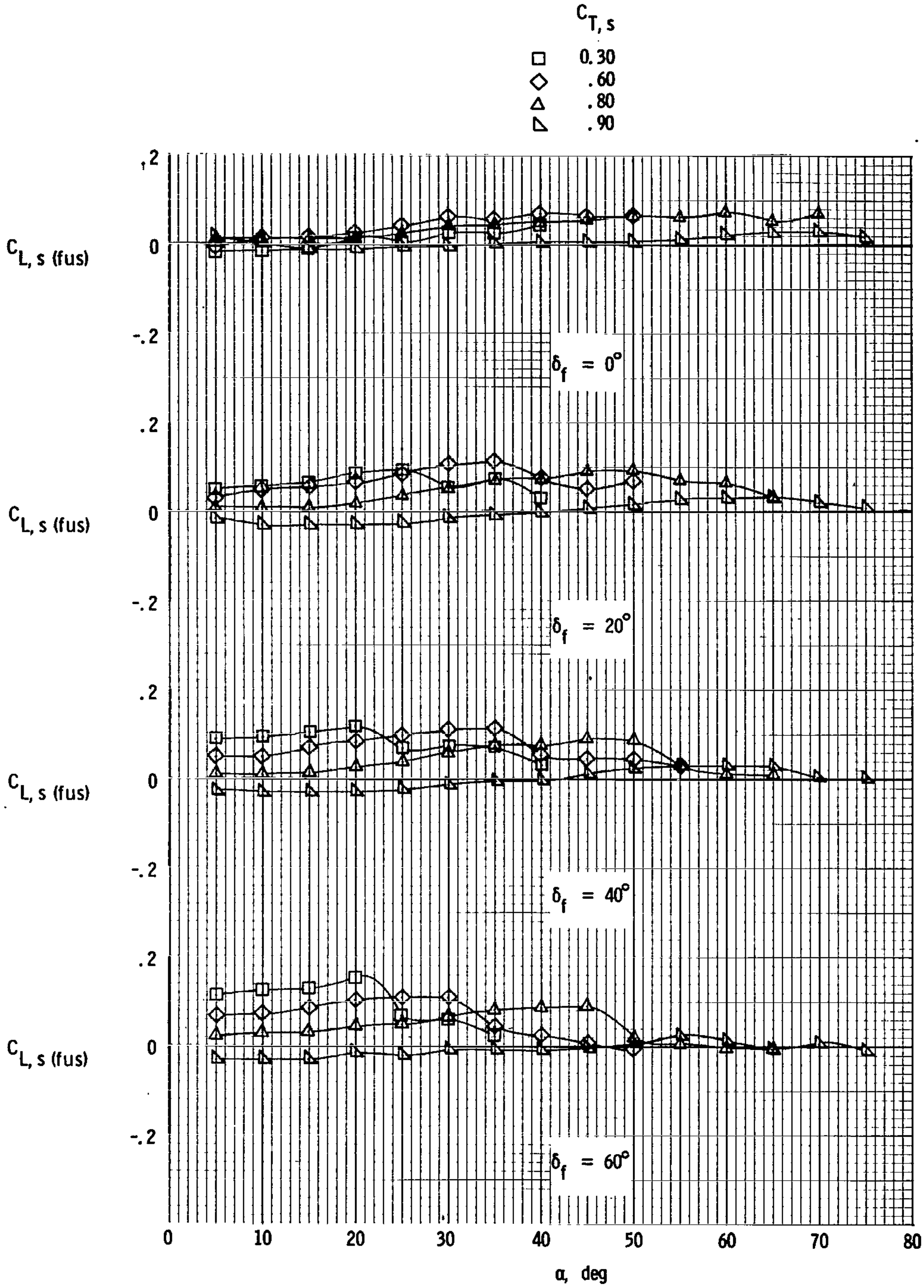


Figure 38.- Fuselage lift coefficients for down-at-the-tip rotation. Basic leading edge; fences on.

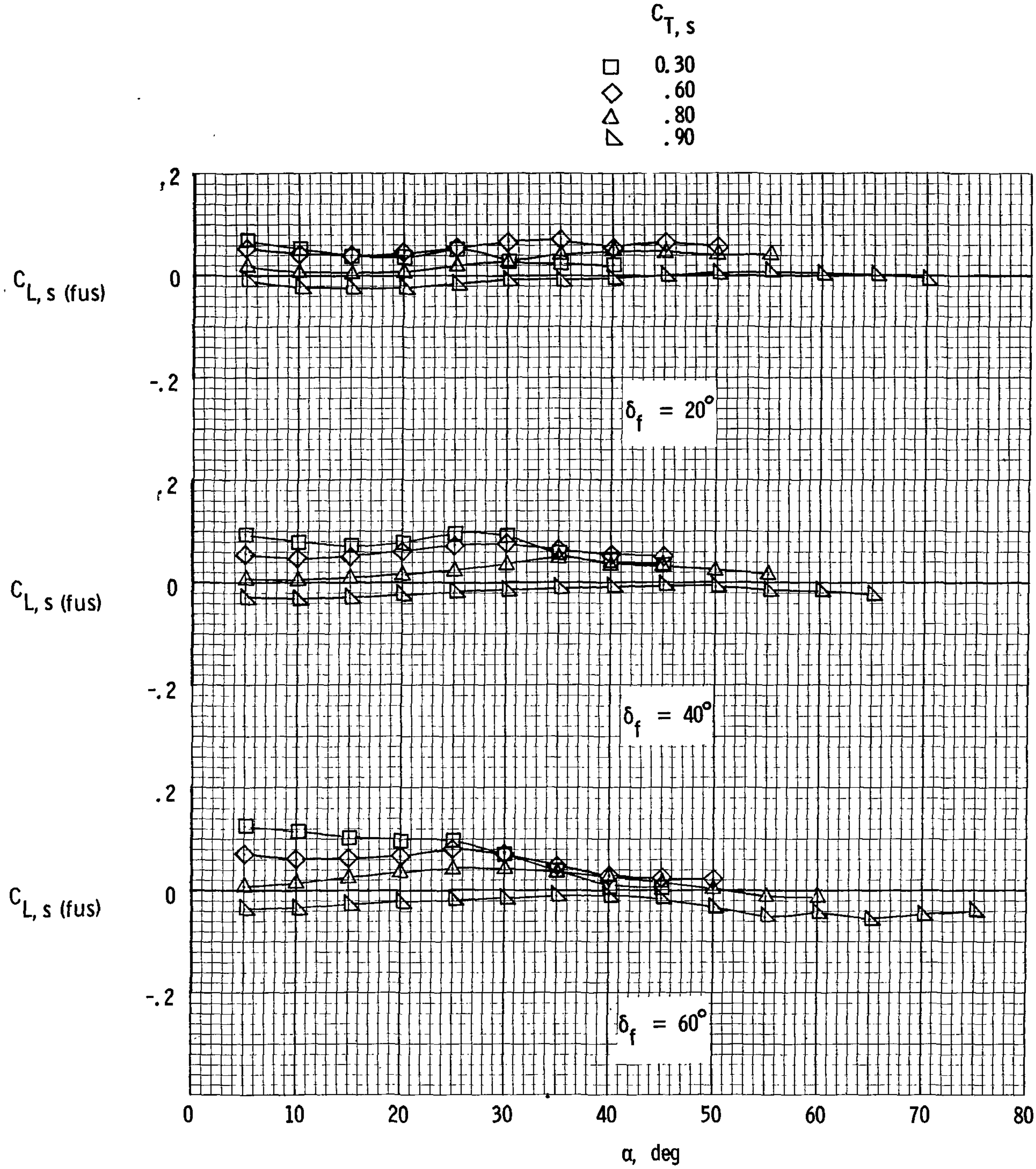


Figure 39.- Fuselage lift coefficients for down-at-the-tip rotation. Inboard slat on.

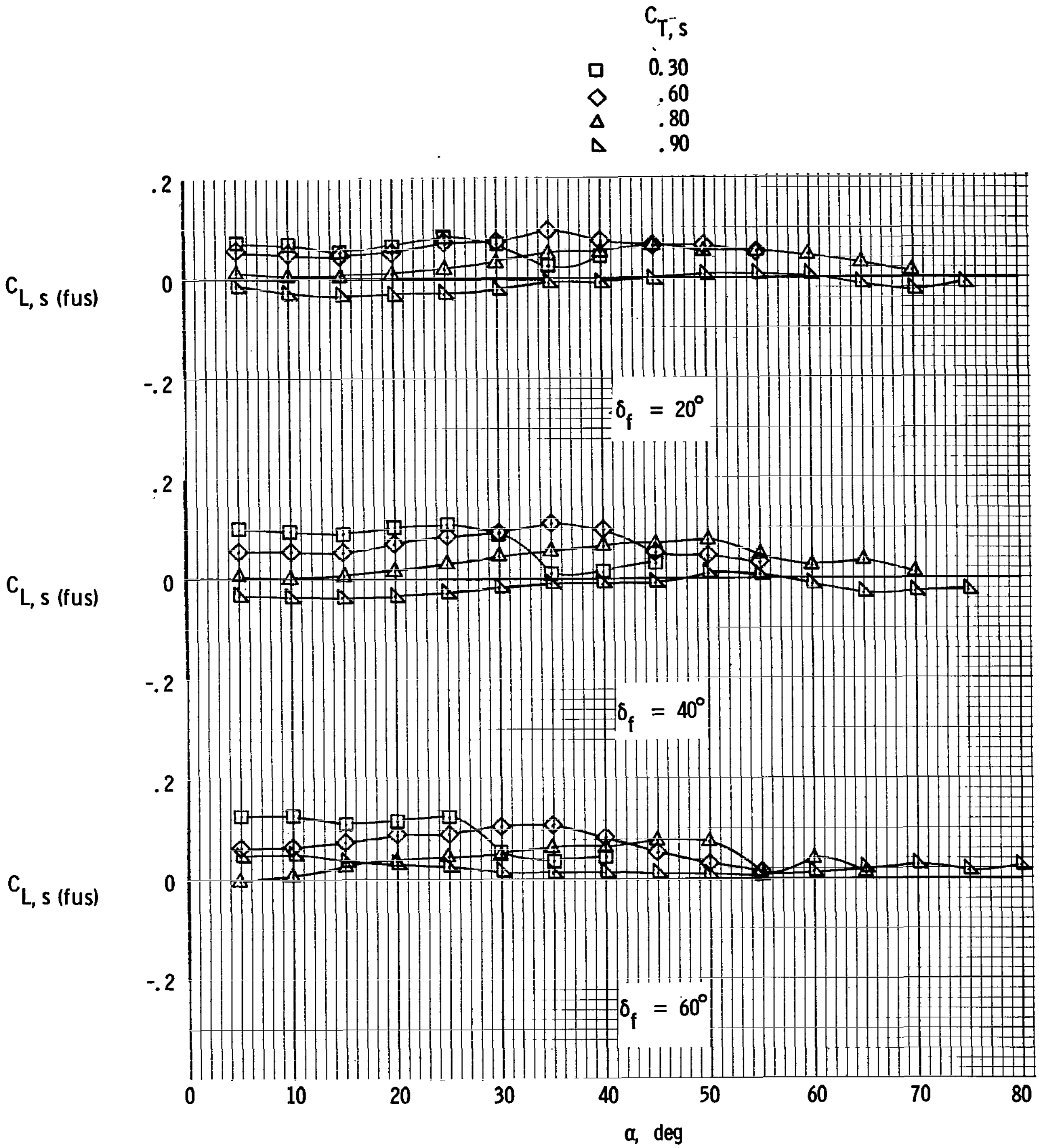


Figure 40.- Fuselage lift coefficients for down-at-the-tip rotation. Inboard slat on; fences on.

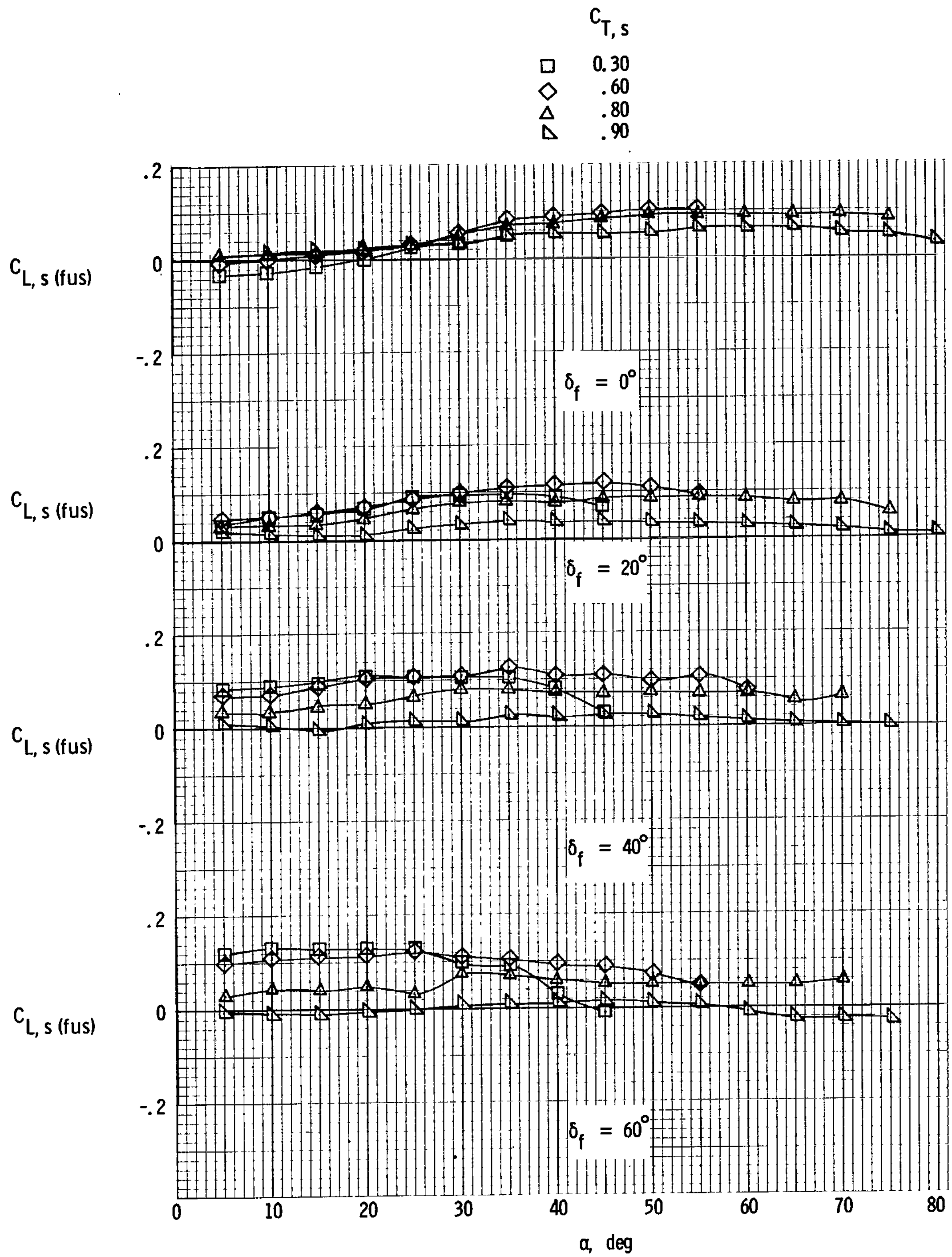


Figure 41.- Fuselage lift coefficients for up-at-the-tip rotation. Basic leading edge.

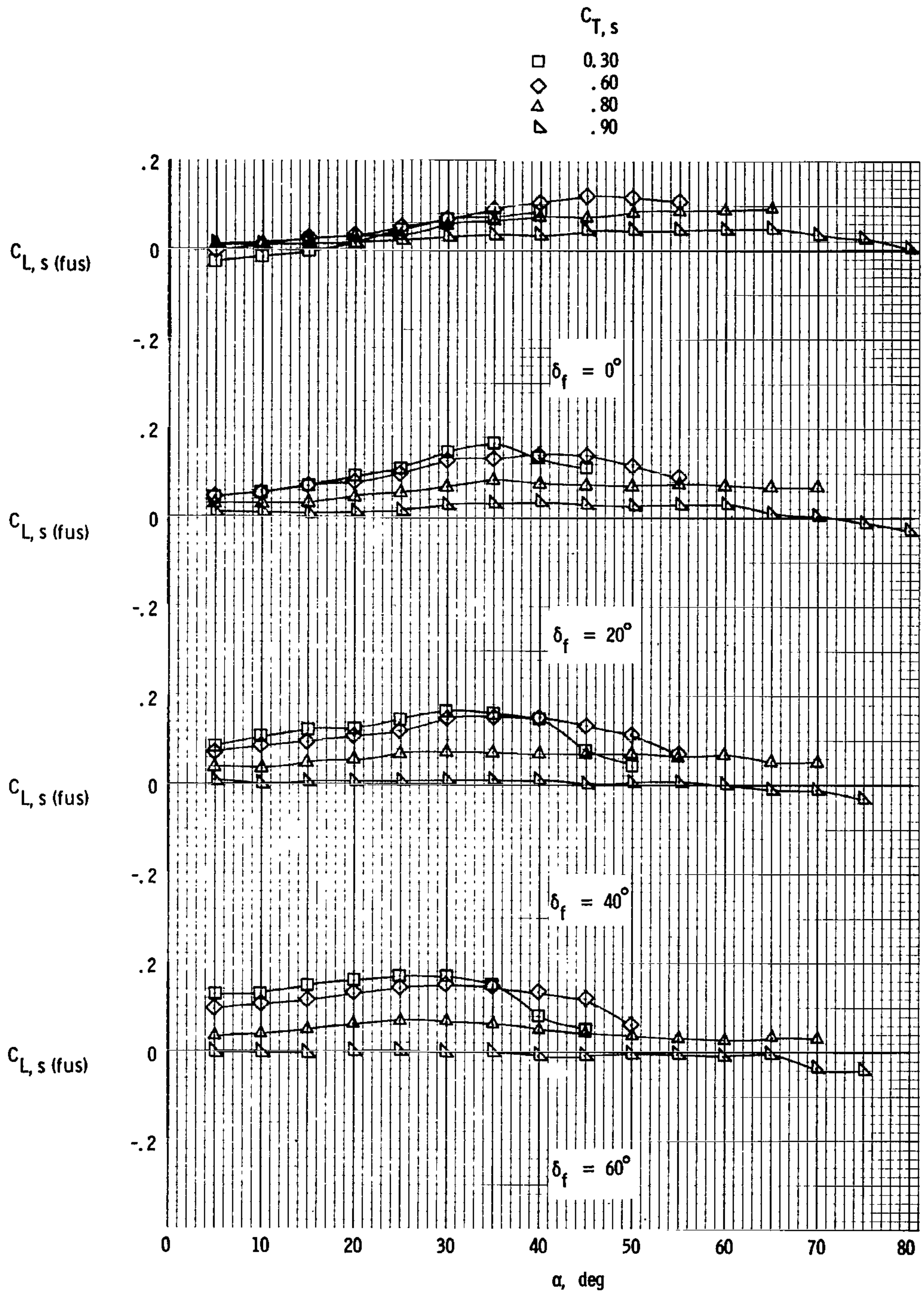


Figure 42.- Fuselage lift coefficients for up-at-the-tip rotation. Basic leading edge; fences on.

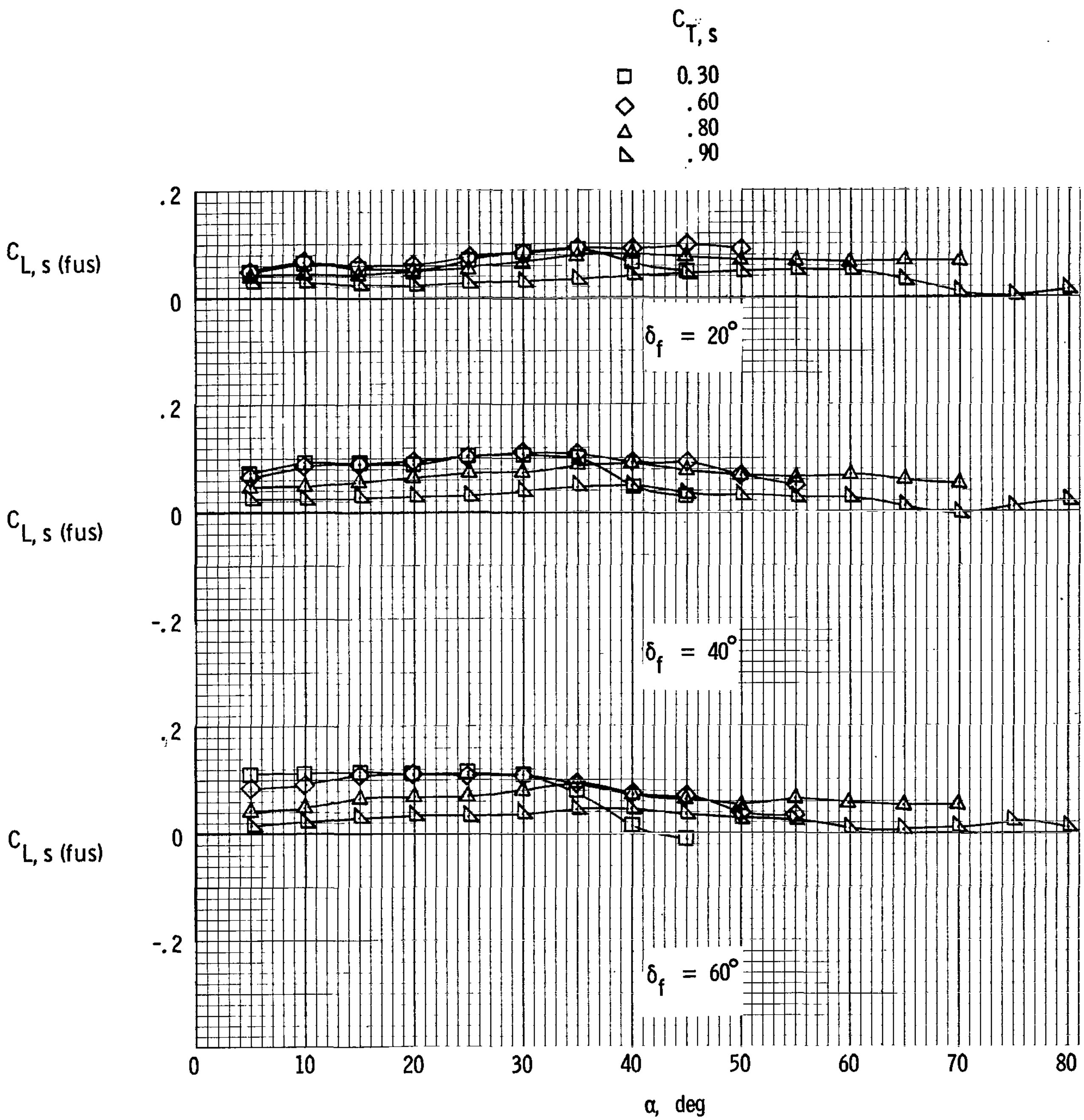


Figure 43.- Fuselage lift coefficients for up-at-the-tip rotation. Inboard slat on.

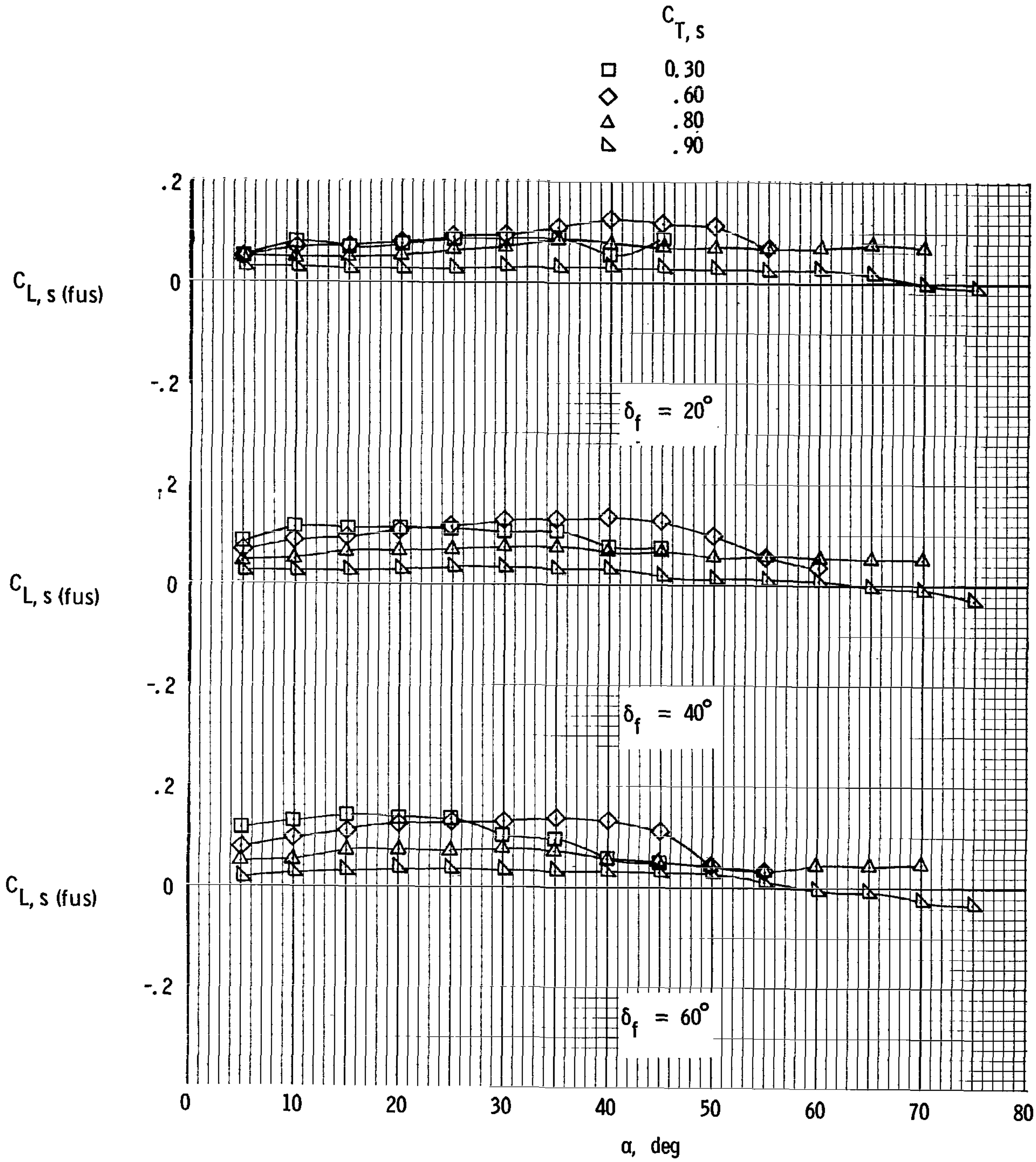


Figure 44.- Fuselage lift coefficients for up-at-the-tip rotation. Inboard slat on; fences on.

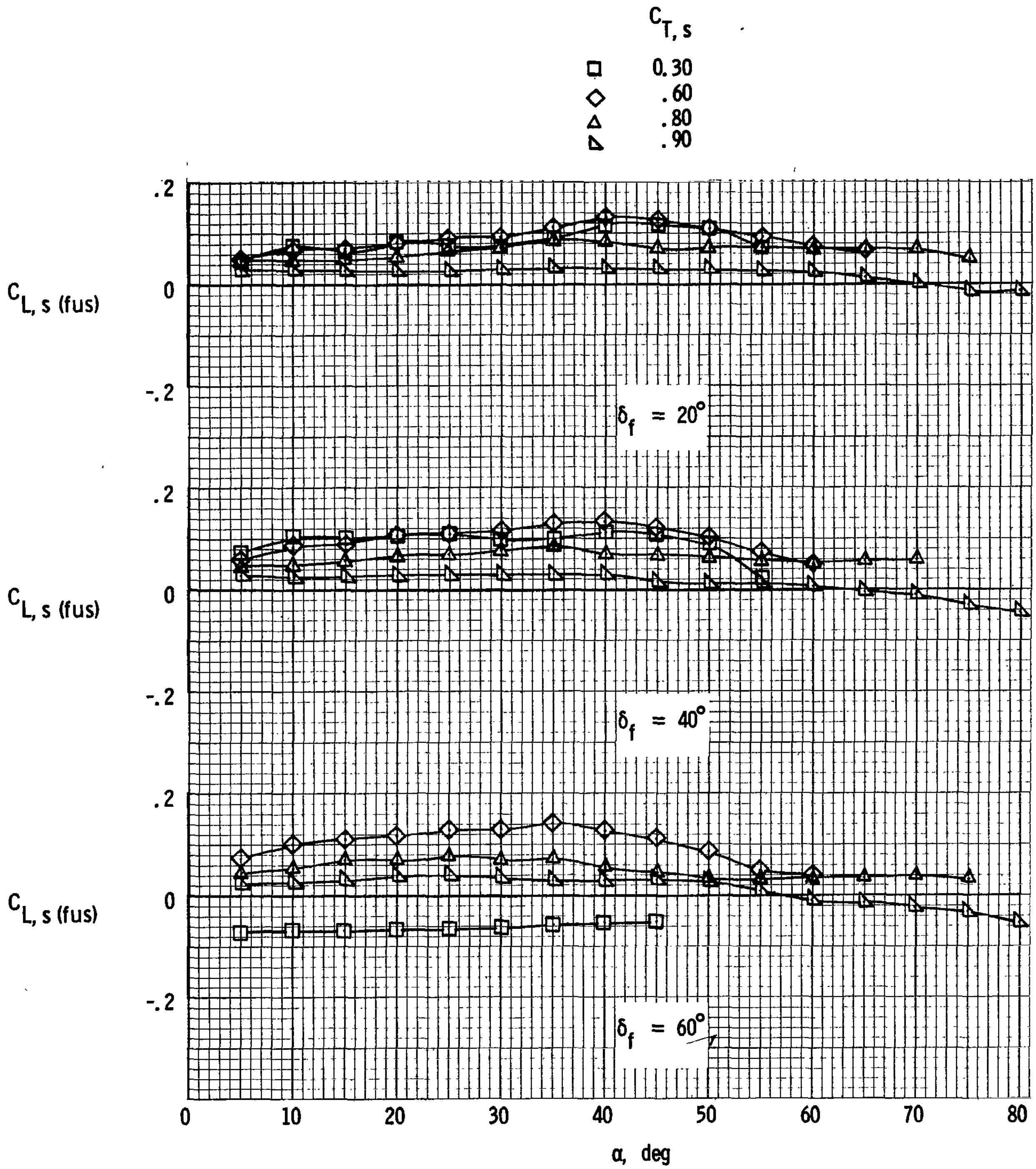


Figure 45.- Fuselage lift coefficients for up-at-the-tip rotation. Full-span slat on; fences on.

NASA-Langley, 1967 — 1 L-5437

"The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

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